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HERMATHENA.

CLASSICAL STUDIES IN TRINITY COLLEGE, DUBLIN, SINCE THE FOUNDATION.

In 1591, now three hundred and fifty years ago, when this College was being founded, Henri Estienne and J. J. Scaliger were in France, Holland had G. J. Voss, Meursius, and Lipsius, while Casaubon, destined later to come to England, was still at Geneva. Of nearer home it has been said[1]: "The Elizabethan age is almost a blank in the history of Greek learning in England. It produced a few translations—mostly of books bearing on matters of theological controversy—but there is hardly a trace in it of that large interest in Greek antiquity which characterized the humanists of the early part of the century." Latin scholarship was a little stronger. But for the most part classical learning in these islands was in eclipse till theological and political controversy had waned, and names like Selden, Gataker, and Hales, come only in the stabler days of the Stuarts. With surprising speed, in less than forty years, the Dublin College had a giant of her own in James Ussher, a thoroughly local product. His work and the succession after him will be traced later. But the teaching methods of the College had better be considered first, before personal achievements are recorded.

Until Provost Hely Hutchinson in 1777 introduced his much-abused two Professorships of French and German,

[1] On p. 13 of Bywater's *Four Centuries of Greek Learning in England.*

Spanish and Italian, the ancient classics monopolized literary study and criticism in Trinity College, Dublin. But literary interest even in the classics was slow to kindle, and for about a hundred years after the foundation Latin and Greek texts were used less as literary works than as sources for teaching logic, physics, astronomy, metaphysics, and ethics. The Aristotelian tradition was still firmly established.

The Caroline Statutes (1637) carefully prescribed the academic course, which was single and compulsory for all. The four classes of undergraduates were lectured in Latin on the Isagogue of Porphyry, and on the Organum (*quam brevissime, non divagando post commentatores a contextu*), Physics, Metaphysics and Ethics of Aristotle, the two junior years being taught by the Junior Greek Lecturer or a Master of Arts, and the two senior undergraduate years together with the graduates, by the Senior Greek Lecturer, who was always a Senior Fellow. This apparently was more or less the original system in the College, which Nicholas Bernard, Ussher's chaplain, describes[2]: "At the first foundation there were but four Fellows, yet the tongues and arts were very exactly taught to all the students being divided into several classes. Aristotle's text was read in Greek by each Tutor to his pupils. Three lectures a day every Fellow read, at each of which there was a disputation, upon what had been read, or the lecture before, and among other ways, they were sometimes ordered to dispute *more Socratico*. On Satterday in the afternoon, each tutor read in Latine a lecture in divinity to his pupils, and dictated it so deliberately that they easily took it in writing, and so was there other lectures also."

Students had by Statute to write a Latin theme and a description of their current text-book every week. Their

[2] *Life and Death of Usher*, 1656, p. 26.

private studies would consist mainly in preparing these themes and commentaries, as well as declamations. There was no special examination for the Bachelor's Degree in the seventeenth century, but candidates had to make two declamations, one in Greek and one in Latin, *in laudem philosophiae*. A sound knowledge of Greek was considered indispensable, as is shown by the resolution of the Provost and Fellows in 1659 that "no student be admitted B.A. unless he produce the Senior Greek Lecturer's certificate of his competent proficiency in the Greek tongue." Candidates for M.A. had to be able to prelect on any part of the first book of the *Odyssey*. This is the first reference to poetic studies that I can find. Students were expected to stay the full seven years from Entrance to Mastership in the College. The best would then be elected to Fellowship, since after the Restoration vacancies, owing to ecclesiastical preferments, were much commoner than now.

The Caroline Statutes strictly enforced the retention of the curriculum as above. But a hundred years later we find a complete change. As a result of Samuel Madden's proposal to give prizes for students showing proficiency in the term examinations an undergraduate course in classical literature was drawn up for the four years thus (Stubbs, p. 199) :—

Junior Freshmen: Homer, *Il.* I–XII, selections from Lucian and Theocritus, Musaeus' *Hero and Leander*; Virgil, *Aen.* I–XII, Sallust and Terence.

Senior Freshmen: Homer, *Il.* XIII–XXIV, *Od.* I–VIII, Epictetus' *Encheiridion*, the *Tabula* of Cebes; Caesar's *Commentaries*, Justin's *History*, Juvenal, Horace.

Junior Sophisters: Homer, *Od.* IX–XXIV, more Lucian, Xenophon, *Cyropaedeia*; Virgil, *Georgics*, Cicero, *De Officiis* or Pliny's *Letters*, Velleius Paterculus, some books of Livy.

Senior Sophisters: Three plays of Sophocles, Aeschines and Demosthenes' *De Corona* and *Philippics*, Longinus' *De Sublimitate*; Suetonius, the rest of Livy, Tacitus.

Minor changes in this were frequently made. In 1759 (Stubbs, p. 205) some Plutarch and Euripides was added, and the amount of Xenophon, Demosthenes and Cicero was increased, while Theocritus, Musaeus, the *Tabula* of Cebes, Epictetus, Justin's history, Velleius Paterculus, Suetonius, and the Odyssey, were omitted.

Entrance candidates were examined privately till 1759, when the first public entrance examinations began. Burke in an extant letter describes how he was examined by Pellesier and the Senior Greek Lecturer in 1744 (Stubbs, p. 203) "very strictly" in Horace, Virgil, and the *Iliad*. The course for the first public Entrance Examination in 1759 was the *Aeneid* and fourteen books of the *Iliad*. Also in 1759 Theaker Wilder, Goldsmith's hated tutor (a mathematician, but the first Regius Professor of Greek in 1761), issued at the request of Dublin schoolmasters directions on what classics were suitable for school study. He recommended in Greek, St. Luke's Gospel, Xenophon, *Cyropaedeia* I–IV, Homer, *Iliad* I–VIII, the "First Book" of Hesiod, some Idylls of Theocritus with Bion and Moschus, Musaeus, the "Golden Verses" and Dugard's Lucian; in Latin, Castalio's *Dialogues*, select *Colloquies* of Erasmus, Cornelius Nepos, Justin's *History* I–XII, Phaedrus, Caesar's *Gallic War*, parts of Ovid's *Metamorphoses*, Sallust, Virgil's *Eclogues* and *Aeneid* I–VII, Cicero's *Orations against Catiline*, Terence, Horace and Juvenal.

Samuel Madden's suggestion in 1731 to award premiums for proficiency was readily accepted by the Senior Fellows. By 1740 £2,500 had been subscribed by members of the College. Twelve years later Berkeley gave one hundred and twenty guineas and a die for two gold medals to encourage graduate bachelors in the study of the Greek language.[3] They are still considered one of

[3] See his letter to Archdale of Dec. 11th, 1751, enquiring whether another donation had anticipated him, in *Literary Relics* by George Monck Berkely, 1789.

the highest classical trophies in the College. In 1798 a later holder of a name long honoured and honourable in Trinity College, Samuel Molyneux Madden, evidently a sympathetic man, left his large estate to found a prize for the best of the disappointed candidates at the Fellowship Examination. At present it is worth something like £350 per annum, and when unneeded for its primary purpose is used for subsidising scholarly publications or for granting travelling scholarships. Small book prizes for success at the termly honor examinations were instituted early in the nineteenth century. Since then, prizes in classics have rapidly accumulated, so that to-day (apart from Sizarship and Scholarship) one can win over £200 besides three gold medals in classics alone from entrance to a year after graduation.

Scattered comments on the standard of teaching in Trinity College during the late seventeenth and the eighteenth century are generally favourable. Lord Chesterfield, who was Viceroy in 1751, stated in that year (*Works*, IV, p. 237): "The Irish schools and universities (*sic*) are indisputably better than ours." Goldsmith, who had reasons not to be partial towards Trinity College, alleges in his *Life of Parnell* that our Entrance Examination was harder than that of Oxford or Cambridge in his time. Macaulay comments on Congreve: "His learning did great honour to his instructors." But there were other opinions, as may be seen from Theophilus Swift's *Animadversions on the Fellows of Trinity College, Dublin* (1794), a vehement tract with many statements, such as "*Barbara celarent* has both more music and more meaning" (*sc.* for the Fellows) "than the hymns of Callimachus or the luminous and instructive pages of Thucydides" (p. 8). It should be added that his son had been "cautioned" in logic. The whole century abounds in pamphlets attacking and defending the College.

One critic fared particularly badly. This was Hely

Hutchinson, Provost from 1774 to 1794. He was rash enough at a meeting of the College Board to complain about the standard of classical teaching at Trinity College in comparison with that in science. Indiscreetly, he went on to allege that "Eaton-college," where his son was, showed better results, and as an example of this he told of an incident in his domestic circle. The Senior Fellows listened critically. One day, he said, he had handed his son a text of Demosthenes asking him to construe at sight. His son had immediately translated some pages fluently, though he had never seen the passage before. One of the Senior Fellows enquired what speech of Demosthenes it had been, and was told the *De Corona*. Then Hutchinson saw that the story was not believed because of that speech's notorious difficulty. He hedged (being a politician) by suggesting that the pages may have happened to be unusually easy ones. The answer from one of the Fellows was crushing: "The difficulties in that book are as thick as the stars in the firmament." The story is from a biased source, namely, Duigenan's devastating and most readable *Lachrymae Academicae* (1777), and Duigenan was one of the ablest of the Fellows in opposition to Hutchinson. His motto on the title-page of the treatise—it is much more than a pamphlet with its 326 pages—is

Quaeque ipse miserrima vidi
Et quorum pars magna fui.

He tells of another ridiculous incident (p. 75). Hutchinson, being academically an ignoramus, tried to impress the College by conducting the public viva voces in classics himself, having learned up in advance facts from a cram-book belonging to his Etonian son. The source of his information was discovered, and mockery only increased against him. It culminated when he happened to ask a candidate, "At what period did eloquence flourish most amongst the Greeks?" Hutchinson had memorised

the answer as "at the time of Alexander's death." Unfortunately the candidate answered, "During the Peloponnesian War." Hutchinson, having no notion when this was, pressed him: "Right, sir, but at what time in that period? Was it not at the death of Alexander?" At which, Duigenan continues, "the candidate then answering, yes, the Provost expressed his applause with great solemnity and pomp, thus killing Alexander in the time of the Peloponnesian War to manifest to the world his knowledge of Thucydides, that favourite author whose name he is so fond of repeating: *Risum Teneatis?*"

Apart from local editions of the classics, which will be mentioned later, Dublin scholars were quickly equipped with well-stocked libraries. The earliest list of the forty books in the College Library in 1600 included texts of Euripides, Plato, Aristotle, Strabo, Ptolemy, and Cicero.[4] The large sum of £1,800 subscribed by Elizabeth's troops after the Siege of Kinsale gave Challoner and Ussher ample scope in their purchases in London. Prices were not high. According to Challoner's list, Scapula's Lexicon cost 12s., Cicero's works, 6s. 8d., an *Iliad* and *Odyssey*, 2s. 6d. each, Virgil, 1s. 4d. in 8vo, and only 10d. in 16mo (what print for candle-light!). But the addition of Ussher's splendid collection after many vicissitudes in 1661 first gave the Library European importance. Later accessions from Palliser, Gilbert and Stearne came in the eighteenth century. In 1802 the Board of the Erasmus Smith Bequest providently bought for the College the 20,000 volumes of Greffier Fagel's collection, containing many rare classical works. H. G. Quin's bequest of early editions, including the Crevenna Aldines of Ovid and a fine vellum copy of the second edition of Virgil (Venice, 1470), was received in 1805. There are also some other Aldines, Daniel Heinsius' *De*

[4] See *Hermathena*, XXVIII, 1902, p. 76.

Contemptu Mortis, 1621, some of Grolier's books, Maioli's Catullus, Tibullus and Propertius, and a copy of Quintus Calaber that belonged to Henry II of France, and Diane de Poitiers. The Library received the copyright privilege in 1801. Besides the College Library, after 1707 Dublin scholars also had the use of the extensive collection of Provost Narcissus Marsh, which was incorporated then into a public library (the first in Ireland). Amongst its valuable sixteenth-century volumes are several texts autographed and annotated by Casaubon, which Marsh acquired with Stillingfleet's books in 1704.

To return to our curricula: in 1833 (the year when the first Dublin University Calendar appeared) the Board decided on drastic changes. Three terms were substituted for the former four, the Easter term being abandoned, and the courses were revised accordingly. Honors[5] candidates in classics were to read about twice as much as the pass men. (There had been special honors lectures since 1800.) Moderatorships, that is, honours degrees in classics, were introduced. The first course for these was: Greek, Aristotle's *Rhetoric* and *Poetics,* Aeschylus' *Agamemnon,* Aristophanes' *Clouds,* Thucydides I and II, Pindar's *Olympians,* Longinus' *De Sublimitate*; Latin, Cicero, *De Oratore,* Lucretius V and VI, Tacitus' *Annals, Germania, Agricola.* The mere Entrance course in 1833 was *Iliad* I–VIII, the Gospels and Acts of the Apostles, Xenophon's *Cyropaedeia,* and Walker's Lucian, together with *Aeneid* I–VI, *Eclogues* I, III, IX, Horace, Juvenal (four satires), Terence's *Andria* and *Heautontimoroumenos,* Sallust, Livy I–III—compare the Dublin University Calendar for 1940–1: "In Latin candidates must present portions of the works of *two* Latin classical writers which are in each case equal in quantity to one book of Virgil's *Aeneid.* In Greek they must" (*sc.* if they chose

[5] This local spelling seems to be a Latinism. It is found in the first University Calendar (1833).

it rather than a modern language) "present a portion of the works of *one* Greek classical writer which is equal in quantity to a Greek play or to one book of Xenophon" (the italics are not mine). Greek ceased to be compulsory in 1904, with little protest and no threnody. But, though the general pass standard in classics has fallen deplorably in quantity and quality, cramped by many upstart subjects, the honors, scholarship, and moderatorship standards are in no way lower, and in duration, scope, and intensity the lectures and examinations are higher, than in previous centuries. In one respect Trinity College is classically unique (I believe)—Latin and Greek verse composition are worth 8 per cent. of the total marks, without any alternative, in the Honours Degree Examination.

The outstanding features of the present system of honor teaching and examination may be summarized as follows[6]:

(*a*) Compulsory attendance at lectures delivered by five or more Fellows. (The average student attends about fourteen hours a week.)

(*b*) Four years of undergraduate honor work, involving satisfactory answering at three or more term examinations (of 12 hours each).

(*c*) Greek and Latin are taught and read as a unity and cannot be submitted separately for honors.

(*d*) The examinations are competitive, candidates being marked and graded occasionally to two places of decimals in a percentage! This has its absurdities, but it stimulates work among the best candidates.

(*e*) There are no optional subjects in the honor, scholarship, or degree, examinations, and in these theses or special subjects are not catered for.

[6] I am grateful to Mr. L. J. D. Richardson (ex-Sch. and Univ. Student, T.C.D.) of Cardiff for this analysis and other points *passim*.

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(Even optional questions are few in most examination papers.) On the other hand, post-graduate research (for Ph.D. or B.Litt.) has increased recently.

(*f*) Viva voces are weighty in all examinations.

(*g*) There are no external examiners (except for Fellowship).

(*h*) There are many undergraduate and graduate medals and premiums to encourage able students to wider and more intensive reading.

In the first half-century of our foundation Greek and Latin were regarded as means to philosophical and theological ends, as the nature of the courses has shown. So it was natural that the first Greek and Latin scholar of international repute from Trinity College should get his fame from biblical and patristic studies. This was James Ussher, one of the earliest pupils of the College, named a Scholar of the House in the Charter, and afterwards a Fellow. Perhaps the most scholarly of his copious writings was his edition of the letters of Polycarp and Ignatius (1644—our Library has a copy with the Archbishop's autograph corrections), but he is most widely known for his chronology of the Old Testament with its dating of the Creation in 4004 B.C. No biblical scholar of his age surpassed him in Europe, and none equalled him in the British Isles. Besides the lustre of his name the College acquired his invaluable collection of MSS. and books, including the Book of Kells. A second name of importance came soon afterwards. This was Dudley Loftus, grandson of the first Provost, who entered in 1635. His extensive biblical and oriental studies were original and important. It was by him that the Ethiopic New Testament was translated into Latin for Walton's Polyglot Bible, at the request of Ussher and Selden.

Seventy years later the record of Henry Dodwell

(entered 1655) symbolizes a change. Scholarship in England and Ireland was turning from theological and biblical studies to classical literature. Dodwell's interest was chiefly in the Greek and Latin historians. He resigned his Fellowship in 1666, and afterwards was appointed to the Camden Professorship of History at Oxford. Gibbon said of him: "Dodwell's learning was immense; in this part of history (that of the upper empire) the most minute passage could not escape him; and his skill in employing them is equal to his learning." But elsewhere (see D.N.B.) Gibbon dispraises his style. Dodwell is the first *alumnus* of Trinity College to be mentioned in Sandys' *History of Classical Scholarship*.

From the beginning of the eighteenth century there emerges a distinction between scholastic and literary activity in the classics. That is not to say that scholars ceased to strive for style and stylists for scholarship in their work. This regrettable tendency was still a long way off. But Ireland's settled political background after the expulsion of the Stuarts encouraged the translator and populariser to offer in a mild form to polite adult society what dons had for centuries been giving less mildly to juvenile academic audiences. Early in the eighteenth century Thomas Parnell, best known as the author of *The Hermit* and the object of Goldsmith's admiration, helped Pope's translations by contributing lives of Homer from ancient sources, and himself translated the *Battle of Frogs and Mice* for the series. He had taken his M.A. here in 1700, aged 21. Pensioners of a few years before him, Jonathan Swift, Congreve, and Nicholas Brady, had also shown skill in literary use of the classics. Swift's *bene* in Latin and Greek in our Term Book is well justified by the learning shown in his *Battle of the Books* and other works. Congreve, his contemporary at College, helped Dryden to revise his translation of Virgil. Brady (best known for his collaboration with Nahum Tate, our only Poet

Laureate) translated the *Aeneid* in 1726. After them came a sequence of less gifted amateurs, or less ambitious professionals, with translations of the more popular ancients. Amongst those of more than local eminence Goldsmith was able to make some money with his histories of Greece and Rome. His reviews of classical works by Gray and Pope and his Essay on Poetry show at least a full "gentleman's knowledge" of polite ancient literature. His failure to do well in his College career seems to have been mostly due to incompetence in mathematics and logic together with his easily imposed upon good-nature and his natural shyness. His more showy contemporary, Burke, who won prizes in Trinity College, is given honourable mention by Sandys as one of the scholarly statesmen of the epoch. Burke's Essay on the Sublime and Beautiful owes more than its title to the *De Sublimitate* of "Longinus," which was one of the most popular classics of his generation. At the end of the century Tom Moore's early interest in Anacreon tuned his ear for his own melodious later verses. Early in the nineteenth century an eccentric and amusing attitude to the classics was adopted by William Maginn (entered 1806). He began with versatile compositions in classical and dog-Latin. Later his celebrated *Homeric Ballads* misrepresented Homer in an arresting manner, and helped, unintentionally, to kill the notion that Homer was only a superior ballad-monger. His treatment of Lucian's dialogues as blank-verse comedies was ingenious, but unsuccessful. In more academic vein Isaac Butt while still an undergraduate published a translation of the *Fasti* and in the following year an annotated version of the *Georgics*. Oscar Wilde won the Berkeley Medal on the fragments of the Greek comic poets in 1874. Some of his earlier verses, showing strong classical influence, appeared in *Kottabos*.

So much for the scholarly *littérateurs;* meanwhile literary scholars had not been idle, though the College has few classical scholars of much more than insular repute

for two hundred years after Dodwell's graduation. The foundation of the Dublin University Press in 1734 encouraged publications. Its first product, a very elegant piece of printing and binding, was the text of seven dialogues of Plato from Serraner's edition. From then to about 1850 there were many books by Trinity College men, mostly designed for men of cultured interests or for local teachers' use. Such were Leland's Demosthenes; Stock's Demosthenes, Aeschines, Lucian; Hawkey's Virgil, Juvenal and Persius, Horace, Terence, Sallust; Moffett's Sallust; Grierson's Justin; Clarke's Justin; Owgan's *Homerica,* Demosthenes, Herodotus; Neilson's *Greek Idioms*; Walker's Livy, *Georgics, Odyssey,* Lucian; Gast's *History of Greece*; Francis' Demosthenes, Horace; Kennedy's Demosthenes, *Agamemnon, Iliad*; Miller's *De Sublimitate*; Stanford's *Phaedo, Apologia Socratis, Fasti*; Stawell's *Georgics*; M'Caul's Horace and *Greek Metrics* (and see further below); McKay's Cicero; Prenderville's Livy; Hamilton's Aristotle; Wheeler's *Hecuba* and Virgil. Of something more than local value were H. E. Allen's editions of the philosophical writings of Cicero and Thomas Keightley's Horace, Virgil, Ovid and Sallust, and Sandys justly singles them out for honourable mention.

Besides editions of standard authors copious and more original communications on classical subjects were appearing in the Transactions of the Royal Irish Academy (founded 1787) by Fellows of the College. Thus in 1787 R. Stack discussed *Sublimity of Writing,* R. Kirwan *The Primeval Language of Mankind, The Origin of Polytheism, Idolatry and Grecian Mythology.* Shortly afterwards there were papers on the Greek Tenses, on passages in the *Agamemnon,* on Style, on Choice of Subjects for Greek Tragedy. A communication by Arthur Browne (Regius Professor of Greek) on Greek Accents in 1799 begins, "Having lately had an opportunity of conversing with modern Greeks . . .," and ends with

the wholly wrong Reuchlinian view which Erasmus had refuted over two centuries and a half before him (but is not dead yet). There were many other similar studies of an elegance and vagueness typical of classical learning in the pre-Wissenschaft days.

Only one discovery of European importance was made in Greek at Trinity College during the whole eighteenth century. This was Barrett's discovery amongst the MSS. in the Library of the sixth-century version of St. Matthew's Gospel (Codex Rescriptus Z or Dublinensis) under a palimpsest of early ecclesiastical writers. (Barrett was Regius Professor of Greek in 1796, when he may have taught Tom Moore.) In his genial portrait in the Fellows' Common Room one can dimly descry on the pages of the book beneath his fingers the title of this, his greatest contribution to scholarship. (Of his work in astronomy, Swiftiana, and Hebrew, this is not the place to speak.) His discovery was published in a handsome quarto volume by the University Press in 1801, and republished by the same press in an edition by T. K. Abbott in 1880. Barrett's edition also included a collation of our Codex Montfortianus—the celebrated manuscript which induced Erasmus (unwisely) under pressure to include the doubtful "Three Heavenly Witnesses" clause of the Latin Vulgate in the first Epistle of St. John, v, 7.

Though not strictly classicists, two Fellows cannot be left unmentioned—George Berkeley (elected in 1707) and Edward Hincks (elected 1813). Both were excellent exemplars of the benefits of the old College curriculum. For during their time a student studied classical literature intensively for Scholarship, and then turned almost exclusively to mathematics and scientific studies for Fellowship. As in the parent university of Cambridge, where Bentley and Porson were far from unskilled in mathematics, so in Trinity College mathematics was considered an essential of higher learning till well on in the

nineteenth century. So Berkeley, who as a Fellow was Senior Lecturer in Greek (the equivalent to the Regius Professorship before 1761), in his works could combine scientific interests with a mellifluous Platonic style, and Hincks' astonishing success in deciphering Egyptian hieroglyph and Assyrian cuneiform in a country rectory was the result of mathematical methods combined with philosophical learning.

In the first half of the nineteenth century few could have expected the sudden effulgence of classical scholarship that was to follow. But courses had recently been reformed. The publication of the first University Calendar in 1833, the Moderatorships, and the new system of honors in 1834, had begun to stimulate competition. The foundation of Queen's Colleges in Belfast, Cork, and Galway (1845–9) offered more employment for university men at home. Moreover, a new attitude to the study of the classics was emerging in the College if a publication of 1834 may be taken as typical. This is an unpretentious book, entitled *Remarks on the Course of Classical Study, pursued in the University of Dublin; addressed to the Candidates for Honors*, by John M'Caul, A.M., with the motto,

Χωρὶς τό τ' εἰπεῖν πολλὰ καὶ τὰ καίρια.

Its general remarks on aims and methods of classical study are judicious, learned, and as valid to-day as ever. I have never seen or heard a more succinct or telling address to freshmen, or one better fitted to attract, discipline and encourage them. The subsequent survey of the honors course is remarkably sound and able. Whoever troubles to read it now will soon be convinced that the writer was a man of vision as well as of scholarship. Apparently his contemporaries were, too, not insensitive to this; for he was chosen as Principal of the College of Toronto in 1839, and became Chancellor of the University of Toronto in 1862.

The first publication of the new era of classical learning in Trinity College was Mahaffy's *Twelve Lectures on Primitive Civilisations* in 1868, which was followed up by him with fourteen provocative and brilliant books on Greek and Roman history within seventeen years. W. H. Ferrar's *Comparative Grammar of Sanskrit, Greek and Latin,* appearing in 1869, contrasted strongly with these in its careful and conservative scholarship. His etymological work was developed soon afterwards in books by John Kells Ingram and Abraham Smyth Palmer. Palmer's namesake, but no relation, Arthur, a Canadian by birth, was elected to Fellowship in 1867, and became Professor of Latin in 1880. His death at his prime in 1897 deprived the College of a Latinist of growing European fame. Besides many valuable papers and emendations of Propertius, Bacchylides and Aristophanes, he edited Plautus' *Amphitryo,* Horace's *Satires,* and Ovid's *Heroides.* Housman in his review of the last work[1] wrote: "Among the critics who have emended Ovid's *Heroides* since the time of Heinsius the first place belongs to Bentley, the second to Palmer, the third to Madvig: van Lennep and Merkel may dispute for the fourth . . . In Propertius . . . his achievement equalled Baehrens' and surpassed Lachmann's . . . Palmer was a man more singularly and eminently gifted by nature than any English scholar since Badham and than any English Latinist since Markland." Tyrrell was the next Fellow in 1868, and his *Bacchae* in 1871 aptly began the finest career in classical literature that the College has known. His works are still fresh; his emendations are still ubiquitous; the time has not yet come when his felicitous taste and sense of style in three languages need to have their memory revived or their importance emphasized. Bury's collaboration as an undergraduate with Mahaffy in an immature edition of the *Hippolytus* (1881) began his indefatigable career as an

[1] In *The Classical Review,* vol. XIII, 1899, p. 172.

editor and historian. He was elected a Fellow at the unusually early age of 23 in 1885, and became Regius Professor of Greek when Tyrrell vacated the Chair in 1898. His later fame is shared with Cambridge, where he became Regius Professor of Modern History in 1902. Louis Claude Purser was four years his senior as a Fellow. Purser's work bulks much smaller in titles than that of any of his four great colleagues. But when it is remembered that he did most of the more laborious work in the Correspondence of Cicero in seven large volumes, and that the quality of his work was superbly high (it is well seen in his little known edition of Apuleius' *Cupid and Psyche*), his ranking will not be disputed. Nor should his generosity in giving the fruits of his research to others, without seeking acknowledgment, be forgotten.

In the long history of classical scholarship there have been single figures in other centres of learning greater than any one of these five, but I doubt whether any university has ever had such a team of indigenous classicists working together as Mahaffy, Palmer, Tyrrell, Purser, and Bury.

But, though outstanding, they were not all. At the same time philosophy was being ably taught and written on by Thomas Maguire, a Platonist, and John Isaac Beare, an Aristotelian. Maguire, who published essays on Platonic problems and edited the *Parmenides*, died in 1889, nine years after his election to Fellowship. Beare (elected in 1887) was in turn Professor of Moral Philosophy and Regius Professor of Greek. Amongst his many publications his *Greek Theories of Elementary Cognition* and his translations of Aristotelian tracts are especially useful. W. J. M. Starkie was elected Fellow a few years later (1890), and produced his exhaustive edition of Aristophanes' *Wasps* in 1897, to be followed later by the *Acharnians* and *Clouds*. And meanwhile contemporary *alumni* were holding classical chairs and producing publications of interest outside. William Ridgeway, who won

his Scholarship in the same year as Purser and Oscar Wilde (1873), became a Fellow of Gonville and Caius in Cambridge, was later Professor of Greek in Cork, and afterwards returned to Cambridge as Disney Professor of Archæology. His publications in literature and archæology contain much of permanent value. In 1873 James Henry, a graduate in medicine, published the first of his five volumes of *Aeneidea*. Their freshness, acumen, and genuine scholarship make them still a mine of knowledge for Virgilians. He had very sensibly decided that to edit Virgil properly one had to be well acquainted with Virgil's country, hence his *Notes of a twelve years' voyage of discovery in the first six books of the Aeneid* (1853), and the general vividness of all his work. Many other classical *alumni* deserve mention. J. F. Davies, Professor of Latin in Queen's College, Galway, edited the *Oresteia* (it has been noticed that when Trinity men are professors of Latin they tend to write on Greek and *vice versa*). M. C. Hime became Headmaster of Foyle College, Derry, in 1877, and wrote useful introductions to Latin and Greek.

During the second half of the century the chairs of classics at the Queen's Colleges in Ireland attracted many *alumni* of T.C.D.: Belfast had C. P. Reichel (later Professor of Ecclesiastical History in T.C.D., and afterwards Bishop of Meath) as Professor of Latin, and T. H. H. Crossley as a Professor of Greek; Cork had E. W. Boulger and C. H. Keene (afterwards a Fellow of the Royal University) in Greek, and P. J. Molohan in Latin; in Galway P. Sandford (a Fellowship Prizeman in T.C.D.) was succeeded by Charles Exon in the Chair of Latin.[8] Overseas, Alexander Leeper became Warden of Trinity College, Melbourne, and H. Posnett Professor of Classics at Auckland. L. J. G. D. Dowdall edited several school

[8] His name abides in "Exon's Laws of Syncope," see Conway's *Making of Latin*, p. 45.

texts, and W. T. Lendrum (afterwards Vesey) became the first Drosier Fellow at Caius College, Cambridge. J. E. Gilmore (Sen. Mod. 1880) edited Ktesias. W. W. Dunlop (Jun. Mod. 1900) became Professor of Classics in the Barbados. F. R. M. Hitchcock's work appears frequently in *Hermathena*.

The corporate fertility of the age is well exemplified in its two new periodicals, *Hermathena* and *Kottabos*. *Kottabos*, which came soon after *Hesperidum Susurri* (1867), was a polyglot miscellany of *jeux d'esprit*, begun under Tyrrell's editorship in 1869. It continued till 1881, lapsed, and was revived in 1888, and then appeared till 1895. The last volume was edited by George Wilkins.[9] *Kottabistae*, verses of the *Kottabos* type, were later introduced into *Hermathena* under Dr. Alton's editorship and continue to appear. The well known *Dublin Translations* preserves the best of the earlier classical versions. *Echoes from Kottabos* (1906) is chiefly in modern vein, though any classical man who has not read Littledale's proof that Max Müller was a Solar Myth and Tyrrell's Herodotus in Dublin has missed some delightful and telling burlesque. *Hermathena* was founded in 1874, and at first published some mathematical papers, as well as those in classics and philosophy. Its reviews of books were from the first vigorous and penetrating, sometimes with acrimonious results, as in the Tyrrell-Maguire-Mahaffy-Sayce controversy on Sayce's Herodotus, in vol. v, 1885.

The College Classical Society, which still flourishes, was founded, chiefly by the initiative of J. I. Beare, in 1906. The inaugural address was given on the Early History of Classical Learning in Ireland[10] by Mr. Justice D. H. Madden, Vice-Chancellor of the University.

[9] Author of *The Growth of the Homeric Poems*, Dublin Univ. Press, 1885, chiefly a summary of German views on the Homeric problem.

[10] Published in book form in 1908.

Amongst its foundation members were W. H. Porter,[10a] now in University College, Cork, and M. T. Smiley, Professor of Greek in University College, London.

Another symptom of increased activity was the founding of new Chairs in classics. W. H. Ferrar became first Professor of Latin in 1870 (a subject which formerly had been taken more or less for granted as the vernacular of classical scholars). T. J. B. Brady was Professor Extraordinary of Classical Literature in 1873, and Mahaffy became first Professor of Ancient History in 1869. A Chair of Sanskrit and Comparative Philology had been established in 1858, and had a distinguished holder in Robert Atkinson (1871–1908). Biblical Greek was given a separate Chair in 1838, and was held from 1875 by T. K. Abbott, a worthy guardian of the traditions[11] of Ussher and Loftus.

Nor has there been any scarcity of Epigonoi to maintain the standard of classical teaching in the College. Indeed the succession is so continuous that the only difficulty is to decide where the older generation ends and the new begins. In ancient philosophy H. S. Macran established his title to succeed Beare by ably editing Aristoxenus' work on harmonics, one of the most abstruse Greek texts in existence. G. W. Mooney, who was Regius Professor of Greek, 1927–33, produced standard editions of Lycophron and Apollonius Rhodius, and in Latin an elaborate edition of Suetonius' *Lives of the Caesars*, VII and VIII, as well as an index to Lucan. Three of their colleagues still strongly uphold the living torch: Dr. J. G. Smyly, the Librarian, formerly Professor of Latin and later Regius in Greek, whose early collaboration with Mahaffy in

[10a] Editor of the *Rhesus*, Cambridge, 1916, and Plutarch's *Life of Aratus*, Cork, 1937.

[11] Further sustained by John Gwynn, W. H. Ferrar, S. Hemphill, R. H. Charles, J. H. Bernard, and the present Regius Professor of Divinity, Dr. J. E. L. Oulton, with Professor R. M. Gwynn.

papyrology has led to productive mastery in that field[12]; Dr. W. A. Goligher, the Vice-Provost, another early collaborator with Mahaffy in history and sociology, who was in turn Professor of Ancient History and Classical Archæology, and Regius Professor of Greek till succeeded by the writer in 1940; and the Registrar, Dr. E. H. Alton, Professor of Latin, who has maintained the standards of his teachers, Purser and Palmer. His pioneer work in the manuscripts of Ovid[13] has been described with remarkable dexterity in litotes by Lenz in his edition of the *Fasti* (Leipzig, 1932): "*Alton non solum in Britannia ipsa, sed etiam apud Belgas, in Italia, Berolini non sine aliquo fructu cum Heinsii vestigia pressit tum hac in re optime de Fastis meruit, quod ut complures codices haud spernendos, qui deperisse videbantur, denuo in lucem protraheret ei contigit . . . Idem Alton etiam in Fastorum commentariis, qui medio aevo conscripti sunt, aliquid inesse demonstravit*"[14]; and other valuable contributions of his to textual criticism will be familiar to Latinists.

The present Public Orator and also Honor Lecturer in Classical Composition, himself a gifted exponent as well as teacher of that art or craft, Sir Robert W. Tate, coming from St. John's, Cambridge, was the first classical Fellow to be appointed since very early years who was not an *alumnus* of Trinity College. Since then, Dr. H. W. Parke,[15] Professor of Ancient History, has been elected from Wadham, Oxford, and Dr. D. E. W. Wormell, from St. John's, Cambridge. A special Honorary Professorship of Classical Literature was founded in 1938 for Dr. R. M. Henry, of Belfast and St. Andrews.

[12] See *The Flinders Petrie Papyri*, 1891–1905, and the *Tebtunis Papyri* (with Grenfell, Hunt and Edgar), 1902–1938.

[13] See *Hermathena*, vols. 20 and 45.

[14] *Op. cit.*, Introduction, p. IV, see further on p. XIII, XV, XVI, XVII, XVIII, XIX, XX.

[15] Author of *Greek Mercenary Soldiers*, Oxford, 1933, and *A History of the Delphic Oracle*, Oxford, 1939.

At the same time classical graduates of the College are teaching and writing elsewhere—as professors in University College, London, in Bristol University and in Swansea; and as lecturers in Saskatchewan, St. Andrews, Cork, Cardiff, Sheffield, Chicago, Exeter, and Swansea, to say nothing of many honors graduates on the staffs of Irish, British, and overseas, schools. And that local interest in the classics is not confined to those engaged in teaching or learning them is shown by publications like *Pliny's Chapters on Chemical Subjects* (2 parts, 1929, 1932), by Dr. K. C. Bailey, Professor of Physical Chemistry, and Aulus Gellius' *Noctium Atticarum liber I*, by Dr. H. M. Hornsby, of the Library Staff.

There is more than a little danger in such a brief account of three hundred and fifty years of teaching and study, seventy generations of classes at the least, that spaciousness of the whole many-branched and turbulent river may seem to dwindle to a narrow, sluggish canal, and that the stature of the greater figures may be thinned and obscured as they jostle each other for inadequate mention. There are many scholars mentioned here whose influence and personalities deserve far more scope than the whole of this, whose work, dismissed here in a sentence, would take an industrious reader many months to master. And names have been omitted that others may judge to have deserved emphatic mention. But these pages will have served their purpose if they have shown how in the first three and a half centuries of its existence the classical school of Trinity College, Dublin, has given its teaching *urbi semper, nonnunquam orbi.*

WILLIAM BEDELL STANFORD.

NOTE.—I am grateful to many colleagues and friends for information in this sketch. I would be further grateful for additions and corrections by readers as contributions towards a projected fuller study.

SOME FRAGMENTS OF COLLEGE HISTORY.—I.

A FEW years ago Columbia University acquired some manuscripts which had belonged to Henry Singleton.[1] Among these Professor Goebel found, inserted in the pages of a treatise on the Exchequer, ten leaves, five of which were blank, while five contained notes of events in the history of this College. Dr. Nicholas Murray Butler presented these leaves to us with the compliments of his University. His gracious act will be greatly appreciated by all who are interested in the story of Trinity College.

There is no difficulty in identifying the writer. He was Matthew French, M.A., B.D., elected Fellow in 1699 and co-opted Senior Fellow in 1710. He held various College offices, and was, when he wrote the notes with which we are concerned, Registrar, Catechist, and Senior Greek Lecturer until November 20th, and subsequently Senior Greek Lecturer and Hebrew Lecturer. He was one of the chaplains of the Duke of Shrewsbury, who had just arrived as Lord Lieutenant. French must have died a few weeks after writing the latest of his notes (Feb. 21st, 1714), for his successor as Senior Fellow was co-opted on March 12th.

French was clearly an ardent Whig[2]; his political activities seem to have been bitterly resented by his Tory

[1] Singleton graduated in 1703. He was Recorder of Drogheda in 1713, when he was elected as member for that city in the new parliament. He became Chief Justice of Common Pleas in 1740, and Master of the Rolls in 1754. He was an executor of Swift's will.

[2] When the Duke of Shrewsbury landed at Ringsend, October 27th, 1713, he was welcomed by speeches delivered by the Recorder of Dublin, John Forster, and by French. The speech of the latter was in Latin, the translation of which by one of French's pupils, J.W. (? = *John Whetcombe*), occupies six pages in Boyer (*Pol. State*, vi, 350–355). It

colleagues. He was particularly obnoxious to John Walmsley and Patrick Delany.[3]

According to his own statement, French kept a journal in the book from which the ten leaves have been taken. These leaves apparently formed a single gathering. They cannot have been part of the journal, but are seemingly only drafts of certain passages, which have been expanded, perhaps with a view to incorporation in the "more full account" to which he alludes in his letter to Dr. Goodwin. It is thus that one can best explain the disorder in dating and repetitions shown in some parts. At least one page has been lost at the beginning; only 41 names are preserved from a list which contained originally 192.

Fragmentary as French's notes are, they throw a valuable sidelight on a troubled period of Irish history. Inside as well as outside College party-spirit ran high in those days. A decisive battle was impending between Jacobite - Tories and Williamite - Whigs. The Dublin contest to which French's first notes refer was a fateful one. The Whigs won in Ireland as they won next year in England, and the Tories did not recover from their defeat for half a century.[4] As regards the history of the College,

is an extravagant laudation of the new Viceroy's religion and political history. His Grace was "a most considerable Instrument in beginning, a most faithful Companion in promoting, and a most resolute Assistant in effecting the late happy Revolution." There is flowery eulogy of the House of Hanover and the "Succession of the Crown, most deservedly as well as most prudently, established by Law."

[3] Delany was Junior Dean until November 20th, when he was appointed Junior Greek Lecturer. He was chaplain to the Lord Chancellor, Sir Constantine Phipps, who was a foremost champion of the Tories. There is, if I am not mistaken, a very interesting allusion to French, made by Delany after his colleague's death; I shall have occasion to refer to it at length later on. There is a fine portrait bust of Delany in the Library, probably by Roubiliac.

[4] Their defeat at the polls was particularly galling to the Tories because they were certain of winning. The Lord Chancellor, writing to Swift, October 24th, is exultant: "the Whigs begin to be sensible they must expect no great countenance from him (*the Duke of Shrewsbury*)

French gives interesting information regarding the way in which residents of the College lost the right to vote, as freeholders, in the city elections; he also gives some fresh details of the contest between the College and the Universtiy regarding the claim of the latter body to control degrees.

Many of the names which appear in the notes are familiar to us from the letters of Swift. The Dean was not present himself during the elections; he had returned to London to help his Tory friends. But we meet the names of those who were to enjoy his friendship in later years, among whom Patrick Delany is prominent, as well as Elwood and Walmsley. Helsham, destined to be his physician, and Provost Pratt are mentioned incidentally. Sir William Fownes, one of the Tory candidates for the

and begin to be a little down in the mouth, since they find Broderick is not to be their Speaker." Again, November 9th: "our elections of Parliament men in this Kingdom prove beyond expectation, for by the nicest calculation can be made we shall have a majority of three to two." Writing to Swift, after the election, December 15th, the Archbishop of Dublin expresses his surprise at the result: "the minor party were assured and declared with the greatest confidence that they were the greater, and it is strange to me that they are not, considering the government, Privy Council, benches, custom house, army pensioners, officers of all sorts, dependants and expectants, were all for them." The Tories reckoned on the support of the new Viceroy. They were sorely disappointed: "In this Ferment (*occasioned by the dispute between the Castle and the City regarding the election of a Lord Mayor*) the Duke of Shrewsbury found the City of Dublin, when he arriv'd there, to take upon him the Government of Ireland: And perceiving that the Pretender's friends had receiv'd no small Incouragement from Sir Constantine Phipps, Lord Chancellor of that Kingdom, His Grace took all proper Occasions, to make good the Hopes and Expectations of the Well-affected to the Revolution and the Protestant Succession: But in a particular manner, on King William's Birth-day (*November 4th*), when His Grace declar'd, He was still the same he was in the year 1688, and publickly drank the Pious and Immortal Memory of King William. The same evening his Duchess gave a magnificent Ball, on the occasion of the Solemnity of the Day, which was celebrated with extraordinary Rejoicing." (Boyer, *Reign of Queen Anne*, p. 651.) Such was the setting of the events recorded by French.

city, had relations with Swift.[5] Owen Lloyd appears as Professor of Divinity; Swift never forgot nor forgave Lloyd's conduct as Junior Dean.[6] The figure of Baldwin dominates the scene. Though he was at this time only Vice-Provost, he moves through French's narrative as he moved through College life, an inflexible, even tyrannical, disciplinarian, uncompromising in politics.

I have printed the notes in full, altering the spelling as little as possible. I have, for convenience of reference, affixed letters in the margins, since I hope to publish in the next number of *Hermathena* a running commentary, which may be of use to readers who are not very familiar with our institutions and our past.

Manuscript of Matthew French.

(*a*) *p.* 1.]

Geo. Cottingham	Hen Thompson
Jo. Smith	Wm. Hodder
Jer. Russell	Jo. Smith
Wm. Brett	Leo. Hatfield
Rob. Ramsey	Theo. Lacour (= *Delacour*)
Phil. Neynoe	Tho. Rowland
Jo. Broadsheet	Hen. Moor
Tho. Lehunt	Ch. Stewart
Cha. Russell	Nat. Bland
Ed. Baines	Ja. Strong
Micl. McKenley	Alex. Nesbitt
Wm. Sybalde	Geo. Talbott
Wm. Warren	Cha. Lucey
Ja. King	Mic. Neligan

[5] See Fownes's letter to Swift, September 9th, 1732, in which Fownes outlines his plan for establishing an Asylum in Dublin. For Swift's opinion of Fownes's character and abilities, see the letter to T. Beach, April 12th, 1735.

[6] On November 30th, 1688, Swift with several other senior students and bachelors was found guilty of rioting in College and defying with insults the Junior Dean (Lloyd). Swift and another bachelor were sentenced to beg the Junior Dean's pardon publicly in Hall on their knees; the degrees of these two were 'suspended' until January 8th, 1689.

Mark Synot
Ja. Medlycote
Wm. Baxter
Fra. Savage
Jo. Forbes
Geo. Rogers
Hen. Raymond
Ric. Tebay
Rob. Taylor B
Rob. Maxwell B
Geo. Sturgeon B
Jo. Garnett B
Ant. Wills—192

These are the names of those that voted for Ald. Fownes & Mr. Tucker at the Blue boyes Hospital, Novembr. 11, 1713.

There were some others afterwards all amounting to 224, as appeared in the House of Commons.

(*b*) November 12. By the Order of the Vice Provost & with his Consent the several persons following met at the Tholsel, and afterwards went in Coaches to the Blue Coat Hospital to Vote for the Recorder & Ald Burton; at both places they were entertained civilly, at the one with Coffee, at the other with wine—

Dr. Richard Baldwin
Mr. Matthew French
Mr. Wm. Norton
Mr. Francis Stoite
Richard Moore B
John Townsend B
John Wandesford B
Edward McNaughton B
Thomas Hudson B
Bernard Norcote
Richard Jannes
Peter Fountaine
Robert French
Joseph Coughland
Richd. Waller
Moses Fountain
Francis Fountain
John Whetcombe
Adam Cauffield
Marmaduke Grove
Tobias Cauffield
Alex. Trimble
Henry Jennings
Jere. Dunbarre
Sim. Peppard

p. 2] Edward Reading
Geor. Crump
Wm. Honner
John Berkeley
John Osborn
John Peppard
Edward Sale
Ricd. Warburton
Edw. Barry
Ric. Lake (= *Leake*)
Christ. Haines
Wm. Smith
Charles Massey
Ricd. Wandesford
Samuel Boyle
Hugh Vaughan

Maurice Warren	John Bohune
Edw. Hawkes	Wm. Cauffield
John Forbes	Nic. Thetford
Thomas Wilson	Thomas Collis
Joseph Keddy	John Loyde
Theod. Leeds	Keating
Daniel	Crofts
	Royse—56

Mr. Delany & Mr. Walmesly have behaved themselves with great insolence & disrespect upon the occasion of these Elections, especially Delany in sending for Scholars [in not giving out the Order of the Vice Provost *deleted*].

Dr. Gilbert & Ned Synge refused to go to the Tholsel [Ned Synge did vote for Mr. Forster & Burton *added above the line*] to give their votes for the Recorder & Ald. Burton, tho' Gilbert gave positive promise.

(*c*) On Saturday, Novembr. 14, the poll stood thus, as appears from an authentick paper published—

Recorder	1670	Burton	1682
Tucker	1465	Fownes	1505
Recorder more than Tucker	205	Burton more than Fownes	177
more than Fownes	165	more than Tucker	217

(*d*) Novembr. 17 (*originally* 16). A Meeting whereat the V. Provost made mention of the irregular procession of fellows & scholars to the Blue Coat Hospital, insisted much upon it as a thing subvertive of the Discipline & Government of the College; the fellows Dr. Elwood, Mr. Loyd, Mr. Walmesly pretended an Order of the House at the meeting before, wch was held upon the first day of voting in the Citty when the tumult happened & the man was killed, wch was denied positively & truly by the Vice P. & myself. Dr. Elwood frequently affirmed, & once with this asseveration *I vow to God,* that he thought there was an Order & he intended no disrespect, tho' this same Elwood gave the Order to the Dean to be published at Night Roll the Evening before, as the Dean, Mr. Delany, confessed to the Vice Provost.

This day Ned Synge went to the Tholsel & gave his vote for the Recorder & Ald. Burton. The Poll stood thus—

Recorder	1705	Burton	1804
Tucker	1597	Fownes	1635
Recorder more than Tucker	196	Burton more than Fownes	169
more than Fownes	158	more than Tucker	207

(*e*) Novembr. 17 (*originally* 18). The Vice Provost Fellows & Scholars mett at the Provost House to choose Parliament Men; the Subsheriff having read the writt & the command of the Sheriffs, the Vice P. told the Electors that the Candidates were Dr. Coghill & Dr. Elwood & that he voted for Dr. Coghill, upon wch they signed according to Seniority; having signed my Name I came away to go to the Castle to read prayers.

The Reasons why I did not vote for Dr. Elwood were, firstly, his dealing underhand with the Scholars & breeding factions before the matter was heard at the board; secondly, his going with the Scholars to vote at the [*p.* 3] Blue Coat Hospital without leave or order from the House, tho when the Vice Provost taxed him & Walmesly & Loyd with this, they pretended leave, wch was denied by the Vice Provost, Gilbert & myselfe; thirdly, it is without precedent; fourthly, it must be an avocation from College business, tho that in some measure he has neglected hitherto.

(*f*) 18. I went to the Tholsel with the Provosts Sizars Books by the Authority of the Vice Provost in order to see who were Minors under age.

(*g*) 19. The Case of the Scholars was argued by Burgh the Counsill of Sir William Fownes & Mr. Tucker; & Mr. Rivett for the Recorder.

Mr. Burgh:—that many instances of Scholars voting in general may be given as in England in both Universities; that the scholars having had a liberal education have capacities of judging of matters; men are at age of discretion at 14 years; they may marry at this age, choose Guardians in soccage (wch is a greater trust than to send a Member to Parliament); they may endow, *ad ostia Ecclesiae*; & there is no express law in this case.

Mr. Rivett:—denies the instance of the Universities in England; saies that tho the Scholars had liberty of voting by Charter, as in other cases (wch yet does not appear), yet their voting would be unlawfull, because the law was otherwise & a man must be one & twenty; that the accepting of the votes of

the Scholars is no argument in the Case, unless it appears that the matter was judicially determined; at the age of 14 a man is at the age of discretion to answer for his crimes; Marriage at 14 is allowed because of propagation, but not to be extended to conveying a mans own right or that of another; that Estates determinable at will are not tenements or freehold, there must be deed, lease or release.

(*h*) 23. Jn Daniels case was heard & accidentally Mr. Usher was produced who affirmed that I said at the Tholsel, when I carried the Provosts Sizars books, that I came there with the authority of the *Vice Provost & all the Senior Fellows at a meeting,* upon wch (passing over the business of Daniel) Mr. Walmesly moved that at a day appointed Mr. French might answer that accusation (Dr. Elwood & Loyd embraced it). Thursday 25th was appointed for my appearing to answer this accusation.

(*i*) 25. Being Thursday, I appeared before the Senior Fellows to answer Ushers accusation. Mr. Walmesly & Elwood desired Mr. Howard to be called in, wch I immediately consented to. Usher brought an affidavit (wherein he used the words *Vice Provost & Senior Fellows,* leaving out the word *all*) sworn before Sir Ric. Cox. His testimony was contradicted positively by several Gentlemen that had been present at the Tholsel, the names of wch are these:—The Recorder, Tho. Bradshaw the Sheriff, Ald. Burton, Mr. Empson, Mr. Nuttell that administered the Oath, Mr. Norton, Sir Hudson, Provosts Sizar. In the company of these Gentlemen came Mr. Keating, Counsellr Hill, Ald. Mason. The College Brewer came on Ushers side & affirmed that in a private conversation I said "Vice Provost & all the Senr fellows," wch Empson & Burton, all the ten present denied.

p. 4] The fellows seemed very weary of this business. At last, as I had don at first when Usher appeared, I desired that no punishment might be inflicted on him & putt the question to the Senior Fellows & desired their positive answer whether Mr. French had given full satisfaction & answer to the accusation of Mr. Usher (wch they agreed to), and further desired em to remember [*these three words added above the line*] that I had forgiven this Usher that had offered so many indignities to me at the Tholsel & afterwards in the College (as that I came without any authority—I was officious—that I would say anything—You are a brave asserter of the Right & Liberties of the College of Dublin—crying after me in the Courts of the Colledge).

(*j*) Novembr. 20th. It was signified that Dr. Loyd would resign his Professorship of Divinity, but I concluding that Dr. Loyd was either ignorant or forgettfull of the advantage he had by Royal foundation, namely, of substituting in case of sickness a fitt Deputy, desired he might be informed of the matter, wch was don by Dr. Gilbert, upon wch Dr. Loyd, as a further instance of the favour of the College, desired time to consider. Dr. Baldwin intimated as if I intended to be Dr. Loyds Deputy; upon wch I positively affirmed I would not, & so I told Dr. Loyd in my Chamber when he offered the place to me, Dec. 1 [or thereabouts *added above the line*] in the Evening.

(*k*) Decembr. 4th. A Meeting was held about petitioning the Parliament for a sum of money towards finishing the New Library at the request of Dr. Elwood and Dr. Coghill. the two representatives of the College. Dr. Coghill laid before us three objections—the address, the business of the Globe where Sorrell was drank, & the voting for Parliament men in the Citty—& desired our answer. Dr. Elwood then condemned the address wch he had signed before, and said it was wrong; so did Dr. Baldwin. Walmesly boldly stood by it and maintained it.

(*l*) Dec. 8. Two Orders were sent to the Vice Provost from the H. of Commons:—

"Jovis, tertio Decemb. 1713. Ordered that the Vice Provost do lay before the house the Registry book of the College in wch the Names & Ages of all the Members of the College that voted in the Citty Elections for Parliament men are entered by Tuesday next."

"Sabbathi, quincto Decemb. Ordered that the Vice Provost do direct the proper officer of the Collcge to return a particular acct on Tuesday next of the Severall persons who have Chambers in the College of Dublin & wch of them have Chambers in their Own right, & wch of them have by Courtesy, & by what title Such as have Chambers in their own right hold the same."

(*m*) Decembr. 9. I writt a letter to hinder Sir Hartley from being nominated to the School of Raphoe to Sir John Stanley Secretary of State to the D. of Shrewsbury; this was upon an intimation that he had been recommended by Dean Clayton. The substance of the letter, that I had just objections to offer against his being presented to the school. But Hartley passed Patent for the school & went with the Vice Provosts leave to the Country.

(*n*) The Commons took away the fellows votes and scholars.

(*o*) *p.* 5] Novembr. 20. The Debts stood thus:—

Dr. Gilbert	149 . 5 . 5 1	Caution	256.	Dr. Readers debts	37 . 2 . 2
Dr. Elwood	157 . 9 . 1 2	.....	92.	Dr. Mossom.....	22 . 6 .
Mr. French	202 . 14 . 11 1	.....	68.	Dr. Tisdal	50 .
Mr. Loyd	113 . 7 . 10	.....	40.	Mr. Mullart	34 . 17 . 5
Mr. Walmesly	239 . 13 . 9 1	.....	152.	Dr. Cunningesby..	16 . 15 . 4 1
Mr. Howard	89 . 16 . 6 2	.....	40.	Dr. Squire.....	127 . 17 . 9
Dr. Helsham	450 . 14 . 10 2	.....	104.	Dr. Hall.....	133 . 5 . 3
Mr. Berkeley	37 . 13 . 7	.....	28.	Mr. Grattan	106 . 4 . 8 3
Mr. Delany	173 . 0 . 3 2	.....	32.		
Mr. Bindon	95 . 13 . 10 3	.....	24.		
Mr. Madden	18 . 3 . 7 3	.....	16.		
Mr. Synge	66 . 10 . 8 2	.....	16.		
Mr. Kearney	50 . 15 . 4 3	.....	48.		
Mr. Thompson	4 . 2 . 8 3				
	1849 . 16 . 4 1				

(*p*) Feb. 8. Theodore Barlow was expelled for drinking to the memory of Sorrell, to the Pretender & confusion to the H. of Hannover, in a form drawn up by me, tho' somewhat changed, and particularly the words *Sorrell* & *Jacobi tertii* left out. Walmesly and Loyd argued upon the words *idoneis testibus* in the ch. *de poenis majorum criminum,* but the rest against them because his not appearing was a sufficient confession or conviction. The 14: I met Dr. Goodwin in Dr. Baldwins room, it being Sunday, and promised to send him the next day the form of this expulsion, wch was accordingly don; moreover promised to give his grace the Duke of Shrewsbury some minutes of the proceedings from Forbes to this day.

(*q*) Feb. 14. The Vice Provost told me of Hamiltons business, that it was true that a warrant from my L. [D. *in ms.*] Chief J. came to him. He advised Hamilton to make up the business. This Hamilton is junior of the Fellows.

The Archbp at St. Patr., being Sunday, mentioned the case of Thompson who at a publick feast drank to those that made no difference between Oliver Cromwell that took the fathers head off & K. W. that dethroned the son.

Mr. Tyrrell insulted the Recorders chaplain with a shout.

Mr. Hamilton—Sir Collis—Sir Travers.

(*r*) Feb. 15. Sent the D. of Shrewsbury by Dr. Goodwin a copy of Barlows expulsion. Robin Jones told me that Kent confirmed to him the business of Thompson & Bindons explanation of it.

p. 6 *is blank.*

(*s*) *p.* 7] 14 Feb., Sunday. When I exchanged turns of preaching with the Vice Provost, the Archbp in the vestry of St. Patricks told me of a Fellow that had at a publick feast called K. W. a Usurper & sd there was no difference between Oliver Cromwell that had killed the king and K. W. that detroned K. James. Upon return from St. Patricks I communicated this matter to the Vice Provost, in the way to the College to Others.

That Evening Mr. Norcote told me that Kent who was lately a candidate had been tampered with by Mr. Bindon. The Vice Provost had heard of it before; also of Sir Hamilton, the fellow, what he had don, of the bond and the money thereupon demanded from him in the Library.

(*t*) 16 Feb. I drew up the following Brief to be given to his Grace the D. of Shrewsbury for his information: —

A Brief of the Case of Edward Forbes, his degradation & the proceedings in the College of Dublin thereupon—

1705. Edward Forbes coming from St. Andrews in Scotland was admitted Batchelour of Arts.

1708 July 13. The same Forbes commenced Master of Arts.

Aug. 2d. The Bishop of Clogher (St. George Ashe) being Vice Chancellour, this Forbes was degraded for the crime of comparing K. William with Balfe, a highwayman hanged at St. Stephens Green, Dublin. At the same time a declaration was publickly made in a numerous congregation appearing upon the occasion, All the members consenting to the declaration but Dr. Loyd, who objected against the words *male feriati* in the preamble of it. All consented to the Degradation and the form of it, but 18, among whom were the Revd Mr. Higgins, Mr. Ratcliffe, Mr. Scott, Mr. Hamilton, Mr. Walmesley, Dr. Helsham; these two last are fellows.

1711. April the 19. The Masters moved to reverse this Sentence of Degradation, but it was denied by the authority of the Vice Chancellour. At this time the dispute about the power of conferring Degrees arose, occasioned by a Liberty wch the Provost (Dr. Pratt) gave to the Candidate Batchelours of walking in Lent to St. Patricks Church in Batchelours Gowns & Hoods, the Commencement having been deferred thro' a want of a deputation, from the D. of Ormond, of a Vice Chancellour.

1711 July the 15. The ArchBp of Tuam (Vesey) being Vice Chancellour, the Masters moved at the Commencement that a question about the Degradation of Forbes might be putt, something therein contrary to the Queens Title to the Crown being contained, but the Vice Chancellour would not consent, but ordered the Proctors to go on to the business of the day, *the conferring of degrees*. Some time afterwards the Masters preferred a Petition to the Duke of Ormond, the Chancellour (then in Dublin), therein complaining that the Senior Fellows had violated their Rights & Priviledges, which Petition was referred to the consideration of the Attorney & Solicitor General, Sir Richard Levinge, Francis Bernard, Esq.

1712 July the 5. The Attorney & Solicitor General made a report wherein they say, 1st, that in the Royal Statutes to which the Charter of K. Charles the First referrs, in the chapter concerning the power of the Provost & Senior Fellows, these words *Graduum collationes definiant & concludant* are mentioned & [*p.* 8] applied to the said Provost & Senior Fellows, but no mention is made in the said Royal Statutes of any power given to the Masters of Arts to give their suffrages in or about the taking of degrees; 2dly, they say that the Masters power of voting is derived from a by law presumed to be made soon after the foundation by the Provost & Senior Fellows, though no such by law does appear or was ever heard of.

The Masters afterwards presented to the Vice Chancellour, the ArchBp of Tuam, a paper called the Masters Claim of Rights & Priviledges in conferring Degrees.

1711. October the 10 or thereabouts. The Provost went to England about this business to the Chancellour & has continued there ever since without giving any Publick account of what he had don to the Vice Provost & Senior Fellows.

$171\frac{2}{3}$ Feb. 17. The Masters at the Commencement renewed the debate about Forbes, but the Vice Chancellour, the ArchBp of Tuam, refused a second time to putt the question.

1713 July the 15. the Vice Chancellour, to the surprise of the Vice Provost & Senior Fellows, told em that if desired at the Commencement, he would putt the question *whether it was in the power of this or any other congregation* to deprive any man, Doctor or Master, of a

degree, which question it was resolved upon a scrutiny by a majority of voices should be referred to the Chancellour.

$171\frac{3}{4}$ What was don at this time is contained in a Narrative drawn up & agreed to by the Vice Provost & Senior Fellows, Feb. 16, in order to be sent to the Provost who is in England, the coppy of which is hereunto annexed.

This account of the order of this whole business I have drawn out of my journal contained in this book, where all the papers are contained.

To Dr. Goodwin, Chaplain to the D. of Shrewsbury—

I have sent you a Brief of the case of Forbes from the beginning of the matter & you may depend upon the truth of what is herein contained. I have kept a constant Journal of this affair, & this may give you &, if you please, my Lord Duke a view of what has been don.

Many observations I might make, but those I shall omitt till I publish a more full account of these whole proceedings, whereby it will plainly appear what opinions and persons have been the causes of all the disputes and troubles that have for some years past disturbed the peace & quiet of the College & (I may say) almost ruined the discipline & reputation of this once a flourishing & well governed society. I thank God I am not at all concerned in these great inconveniences brought upon our society, tho I may say I have suffered much calumny, many injurious reflections for my steady adherence to, & defence of, the proceedings against Forbes, & thereby a Vindication of K. Williams person & government. God grant us peace & quietness.

I am
Dr Sir
Yr affect. freind & humble
Servt
M. F.

Feb. 17, $171\frac{3}{4}$.

(*u*) *p.* 9] Feb. 9, $171\frac{3}{4}$. The Congregation of Doctors & Masters having mett together in the Regent House together with the V. Provost & Senior Fellows according to the Usual form & Method of Commencements, the Right Revd the Vice Chancellour had scarce got to the seat appointed for him, when Mr. Campbell was pleased, even before the Senior Non Regent

was fixed upon, and consequently before they were formed into a complete & regular body, to move for the reading the sentence of Forbes Degradation, & that motion being seconded, the Vice Chancellour himself, after a very short debate upon it, called out for the sentence to be read, & when the Revd Dr. Baldwin the Vice Provost signified his dissent, he called out again for the sentence, telling him that he did not ask his consent; which short answer from his Grace intimating that no regard was had in that Assembly to the Provosts Negative (which is plainly invested in him by the 2d Chapter of the University Statutes), the V. P. was pleased to insist upon his Right of a Negative & to assure the V. C. that if that was not allowed him, he must be obliged to withdraw from the Regent H., which he did soon after that declaration, & the rest of the Senior Fellows immediately followed him, to support that right which they believe him to be possessed of, except the Reg. who staid a little while behind in the Regt House till the V. P. demanded his attendance with the Registry at the Provosts House by Mr. Syng, one of the Junior Fellows; whither he no sooner came & delivered the Reg. into the V. P. own hand, but the V. Ch. demanded his attendance in the Rt house by the Bedle, whereupon [*the narrative breaks off thus*].

(*v*) *p.* 10] & here some of the Masters took occasion to throw a slur upon Mr. ffrench, a Senior Fellow, for carrying the P. Sizars Book to the Tholsell & to move that a censure of that congregation should be passed upon him, after a very rude & irregular manner. J. Elwood & Walmsley were against the word *rude* being inserted, tho it was in the rough Draught. Gilbert against them and V. P.

(*w*) Feb. 21. The Vice Provost told me that My Ld Chief Justice Cox sent to him about Thompson the fellow, who at the Candidates feast drank a health to all those that made no distinction between Oliver Cromwell that killed the father & K. W. that dethroned the son. His answer was that one Kent was present & heard the matter. Confirmations the week before had been deferred & in this interval Kent putt his name out of the books, but Kent owned this matter to Robin Jones who told me of it.

E. H. ALTON.

350TH ANNIVERSARY.

There will be further contributions on the history of the College in our next issue.—EDITOR.

INDEX TO THE SPEECHES OF ISAEUS.—PART VII.

κατηγορέω—κῶμος.

For the Speeches the text used is that of Professor E. S. Forster (Loeb Series, 1927); for the fragments, that of Baiter and Sauppe's *Oratores Attici* (1850). References are made from time to time to the edition by William Wyse (Cambridge University Press, 1904). S.-J. = the new edition of Liddell and Scott's Greek Lexicon, edited by H. Stuart-Jones.

K (*continued*).

κατηγορέω.

I. 9 ('decide,' with dependent relative clause), 19 (*παρανοίαν αὐτοῦ*, 'accuse him of'), 34 (*τῶν διαθηκῶν*, 'attack'), *ib.* (as 19), 49 (*ἐκείνου*, 'accuse'); VI. 62 (*ὥσπεω καὶ ἡμεῖς κατηγορήσαμεν*, 'just as we made it the subject of our attack'); VII. 28 (absolute, 'complain'); VIII. 20 (as VII. 28), 27 (*Διωκλέους ὅτι . . .* 'accuse D. of . . .'); XI. 32 (*τὴν ἄλλην ἀπολογίαν . . . τῶν κατηγορηθέντων*, 'the rest of my defence against the charges brought against me,' F.), 37 (*κακίαν κατηγοροῦντα ὡς . . .*, 'accusing me of turpitude on the ground that . . .').

κατήγορος.

XII. 8 ('accuser').

κατοικίζω.

VI. 21 (*κατοικισθεῖσα δ' ἐνταυθοῖ πολλῶν καὶ κακῶν ἦρξεν*, 'her establishment there had many evil consequences,' F.)

κατοικοδομέω.

VIII. 41 (*τὸν μὲν τὴν πρεσβυτέραν* (*sc.* *ἀδελφὴν*) *ἔχοντα κατοικοδομήσας καὶ ἐπιβουλεύσας ἠτίμωσε*); fr. 23 (*κατῳκοδόμησεν ἀντὶ τοῦ κατέκλεισεν εἰς οἴκημα καὶ ἀπέκτεινεν Ἰσαῖος ἐν τῷ κατὰ Διοκλέους πολλάκις*, Harp.).—In fr. 23 the words *καὶ ἀπέκτεινεν* have been introduced by a confused recollection of VIII. 41. What happened was that Diocles forcibly confined his victim to a room in his house by nailing up the door, and thus prevented him from appearing to answer a charge, which, in turn, directly or indirectly brought about *ἀτιμία*.—The verb does not recur in the Orators, and elsewhere means 'to build,' 'spend on building.'

κατοκνέω.

fr. 15 (6 F.).—'Shrink from': here with inf., as in Isoc. 1. 19; Ps.-Dem. 10. 43, 60. 6; absolute, Isoc. 6. 75; Dem. 23. 4, 29. 1; with acc., Ps.-Dem. 61. 37. Not used by the other Orators or by Plato; twice in Thuc., 2. 18. 5 (with inf.), 2. 94. 1 (absolute).

κατοκώχιμος.

II. 28 *ἵνα* (*τὸ χωρίον*) *κατοκώχιμον γένηται*, 'in order that the land might be held as a pledge,' F.; 'afin que l'immeuble pût être saisi,' Dareche. In this sense S.-J. quotes this passage only.

κατορθόω.

IV. 22; VIII. 37; XI. 31.—'To be successful' in litigation. This verb occurs frequently in Isoc. and Dem., twice in Aesch. (1. 191, 3. 234), once each in Lys. (18. 13) and Din. (1. 13); 22 t. in Thuc., and frequently in Plato. It is almost always intransitive, followed at times by an accusative of

reference; but the occasional use of the passive shows that the verb might have in prose the transitive use found in verse (*e.g.* Soph. *El.* 415 f.), though most of the examples quoted by S.-J. are to be rejected.

κεῖμαι.

I. 25; II. 24; III. 32, 50; VI. 9, 29, 32, 39, 41; VIII. 19; fr. 172.—Four meanings: (1) 'to be deposited,' of documents: I. 25; VI. 29, 32; (2) 'to be enacted, established,' of laws: II. 24; III. 50; VI. 9; VIII. 19; (3) 'to be lying dead': VI. 39, 41; fr. 172; (4) 'to be bestowed,' of a name: III. 32.

κελεύω.

II. 8, 10, 13; III. 11, 58, 64; IV. 14; V. 22; VI. 12, 16, 25, 36, 62, 65; VII. 23, 28; VIII. 24, 31, 32, 38, 39, 41; X. 2, 13, 14, 19, 23; XI. 17, 23, 33, 35, 46; fr. 133 (37 F.).

κερδαίνω.

I. 23 (*τηλικαῦτα μέλλοντας . . κερδαίνειν*).

κέρδος.

IX. 26 (*διὰ τὸ ἑαυτοῦ κ.*, 'for his own profit').

κεφάλαιον.

I. 48; XI. 50.—In I. 48 we have *κεφ. δὲ τῶν εἰρημένων*, in the same kind of construction as our 'To give the pith and substance of my contentions:' a frequent use of the word. In XI. 50 we have: *ἐγὼ δ' ἓν κ. ἐρῶ πάντων μέγιστον, ὃ καὶ ὑμῖν οἶδ' ὅτι δόξει δίκαιον.* This is an odd sentence, made odder by the very unusual omission of *εἶναι* in the *ὅτι*-clause. However, if there is no corruption, it might be translated: 'I shall put forward one all-surpassing proposal which will

go to the root of the whole matter.'—Besides the use seen in I. 48, we find also 'total,' of various sums of money (cf. Lys. 19. 40, 43, 59; and it is sometimes best translated by 'essential feature' or 'most important point'; *e.g.* Isoc. 7. 35, Lyc. 73. The article is sometimes used, as Isoc. 5. 154, 7. 69; Hyp. 2. 7, 3. 4; Lyc. 73 τὸ κ. τῆς νίκης, 'as the crowning result of their victory.'

κηδεστής.

II. 29; V. 33, 34; VI. 7. 27.—A word denoting 'connexion by marriage'; the precise degree of relationship must be gathered from the context. Always 'brother-in-law' in Isaeus.

κῆπος.

V. 11 ('garden').—In the Orators only here, Hyp. *In Dem.* fr. VII Kenyon, and Ps.-Dem. 47. 53, 50. 61.

κηρυκεία.

fr. 46 (κ. · ὁ διδόμενος μισθὸς τοῖς κήρυξιν ἐπὶ ταῖς γινομέναις πράσεσιν Harp.). Plato (*Laws* 742 A) uses the word in the sense of 'mission abroad' (ἕνεκα . . . πρεσβειῶν ἢ καί τινος ἀναγκαίας ἄλλης τῇ πόλει κηρυκείας); so also in a law ap. Aesch. 1. 21. In Hdt. 7. 134 it means 'the right to accompany embassies as herald,' carrying the κηρύκειον or 'herald's staff' mentioned by Thuc. 1. 53. 1, Din. 1. 18, and Ps.-Dem. 51. 13.

κηρυκεύω.

fr. 162 (τὸ δ' ἔργον ἀπὸ τῶν κηρύκων κηρυκεῦσαι ἔλεγον, καὶ Ἰσαῖός που λέγει 'κηρυκευσάτω' Pollux 4. 94).—This rare verb means, in the active, 'report,' 'announce' (here, Aeschylus *Suppl.* 221, Eur. *Tro.* 787, Plato *Laws* 941 A); in the middle, 'serve as herald to an embassy or public mission' (Aesch. 1. 20)—a distinction overlooked by S.-J.

κινδυνεύω.

I. 1, 6; III. 62; VI. 5; IX. 15; XI. 35; XII. 8 *bis*.

κίνδυνος.

IV. 22; VI. 1, 2, 52; VIII. 3, 43; XI. 13, 21.

κλαίω.

VIII. 22.

κλαυθμυρισμός.

fr. 163 (κ., ὡς Ἰσαῖος, Pollux 2. 64).—'Whimpering': cf. Plut. *Lyc.* 16. 3, *Mor.* 672 F.

κλέπτης.

IV. 28.

κληρονομέω.

I. 40; II. 35; IV. 7, 10, 19, 25; VI. 7, 56, 63; VIII. 6, 31, 34, 45; IX. 32, 33; X. 10.—'Inherit,' with gen. rei except VI. 63.

κληρονομία.

II. 47; III. 1, 12, 50; VI. 63; XI. 1, 2, 7 *bis*, 10, 12 *bis*, 13, 22, 25.—'Inheritance,' 'estate' in II. 47; III. 12; XI. 7 *bis*, 12 (2nd), 22; 'right of inheritance' elsewhere.

κληρονόμος.

I. 36, 34, 44, 45, 46, 50; II. 39 *bis*; III. 1, 2, 5, 9, 57, 58, 65, 67, 75; VI. 4, 17, 26, 45, 51; VIII. 32; IX. 23, 34; X. 4.

κλῆρος.

I. 17; II. 2, 46; III. 1, 2 *bis*, 3 *ter*, 6 *bis*, 9, 30, 32, 33, 41 *quater*, 43 *ter*, 44, 50, 51, 52, 53, 57 *bis*, 58, 59, 60, 61 *bis*, 62, 67, 69, 73 *bis*, 78; IV. 3, 4, 5, 12, 15, 24, 25; V. 1, 2, 3, 5, 6 *bis*, 7 *bis*, 8, 12 *bis*, 13, 14 *bis*, 15, 16 *ter*, 17, 18, 19, 20, 21, 24, 26, 27 *bis*, 29, 35, 40; VI. 3 *bis*, 4 *bis*, 46 *bis*, 52, 56, 57, 58, 59

61; VII. 3, 4 *bis*, 6, 23, 29, 31 *bis*, 35, 37, 42, 44, 45 *bis*; VIII. 1, 2, 3, 25; IX. 1, 3, 24; X. 1, 3, 4, 5, 7 *bis*, 8, 14, 15, 16 *bis*, 17, 19, 21, 23, 26 *bis*; XI. 3, 5, 7, 9 *bis*, 10, 13, 15, 17, 18 *bis*, 19, 20, 24, 26, 28, 44, 45, 47; fr. 84 (for which see under *μνέω*).

κληρεύω.

fr. 88 (*κληρεῦσαι δ' ἐστὶ τὸ κληρῆρα γενέσθαι, ὡς Ἰσαῖος ἐν τῷ κατὰ Κλεομένδοντος* Harp.), repeated in fr. 108; fr. 119. See under *ἐκκληρεύω*.

κληρήρ.

fr. 108 (*κληρῆρες μὲν οἱ ἄνδρες δι' ὧν εἰς τὰς δίκας προσκαλοῦνται οἱ διαζόμενοί τισιν· ἔδει γὰρ παρεῖναί τινας ὥσπερ μάρτυρας τῆς προσκλήσεως· Ἰσαῖος ἐν τῷ πρὸς Νεοκλέα περὶ χωρίου. πολὺ δ' ἐστὶν ὅλως τοὔνομα παρά τε τοῖς ῥήτορσι καὶ ἐν τῇ ἀρχαίᾳ κωμῳδίᾳ* Harp.).—We find it 8 t. in Dem., but nowhere else in the extant portions of the Attic Orators.

κλίνη.

VI. 35 ('bed').

κοινῇ.

IX. 26 (of persons acting in conjunction).

κοινόν, τό.

VII. 30 (*τὸ κ. τῆς πόλεως*, 'the state'); XII. 11 *τῷ κοινῷ τῶν δημοτῶν*, 'the community of the deme,' F.).

κοινόομαι.

IX. 24, 25 (in both followed by *αὐτῷ*, 'to go shares with him'); XI. 20 ('to make a compact' F.), 26 (*κοινώσασθαι τὸ πρᾶγμα*, 'to have arranged the affair'), 50 (*κοινώσασθαι γὰρ ἐθέλω τὴν οὐσίαν τὴν ἐμὴν τῇ τοῦ παιδός*, 'to bring my whole estate into hotchpotch with that of the child,' F.).

κοινός.

III. 11, 16, 77; VI. 9; VII. 1, 16, 17 *bis*; XI. 50; fr. 15 (6 F.).—In III. it means 'at the disposal of,' referring to a woman, and is followed by *τοῦ βουλομένου* in 11, by *τῷ βουλομένῳ* in 16, and by *τοῖς βουλομένοις* in 77: cf. VI. 9 *οὑτοσὶ ὁ νόμος κοινὸς ἅπασι κεῖται* 'holds good for all men alike' (F.). In VII. we have *τὸ κοινὸν γραμματεῖον*, 'the public register.'

κοινωνέω.

I. 40; VIII. 16.—'Share in,' with genitive.

κοινωνία.

IV. 26 ('business partnership'); IX. 30 ('association,' 'confraternity'); XI. 21, 23 *bis* ('compact').

κοινωνός.

IX. 13 (*ἱερῶν καὶ ὁσίων κ.*: see *ἱερός*).

κολάζω.

fr. 132 (36 F.), 133 (37 F.).

κολακεία.

VIII. 37 (coupled with *θεραπεία*, *q.v.*).

κομιδῇ.

VI. 35 ('completely').

κομίζω.

I. 12, 15; III. 8, 9, 78 *bis*; V. 4, 13, 14, 19, 22, 27, 30, 34, 44; VII. 7 *bis*, 10; VIII. 8, 21 *bis*, 25; IX. 4, 7; fr. 7 (3 F.).

Always middle, except V. 44, VIII. 21 (2nd), fr. 7, active; and VIII. 25, IX. 4, 7, passive. The usual meaning is 'recover,' 'get' (property, money, dowry, etc.). We also find 'bring into one's house,' I. 12, 15; VII. 7; VIII. 8 (all

middle); 'bring,' 'fetch,' 'transport,' V. 44 (active); VIII. 21 *bis* (middle and active), 25 (passive); IX. 4, 7 (both passive); fr. 7 (active).

κοσμέω.

V. 42 (κεκοσμήκασι τὸ ἱερόν); VIII. 22 ('deck' a corpse).

κόσμιος.

IV. 27; X. 25; fr. 131 (35 F.).—'Orderly,' 'law-abiding.'

κούρειον.

VI. 22 ἀλλ' ἀπηνέχθη τὸ κ., 'the victim for the sacrifice of admission [to the phratry] was removed from the altar' (F.). See Wyse's discussion. Outside inscriptions the word is quoted only from the fragments of the *Andromeda* of Sophocles.

κρατέω.

V. 30; VII. 20, 22; VIII. 2; X. 12; XI. 17, 35; fr. 90 (26 F.).—'To get into (have in) one's hands,' with gen. (V. 30, X. 12, fr. 90) or absol. (VIII. 2); but 'to be preferred' for succession to an estate' in VII. 20, 22; XI. 17. This leaves XI. 35 ψήφῳ κρατήσας ἐγὼ τοὺς ἔχοντας, 'having won my case against the men in possession.' For the acc. in the Orators cf. Isoc. 4. 35, 65; 5. 92; 6. 21, 24; Lyc. 104; Aesch. 2. 30 (I have not investigated Dem.).

κρεανομέω.

IX. 33 αὐτῷ οὐδεπώποτε κεκρεανομήκασι, 'they have never given him any share in the victims' (F.), and so did not admit that he had been duly adopted. S.-J. quotes also Luc. *Prom.* 20; *I.G.* 2^2. 847. 25; D.S. 34. 12; Sopat. 20; Theoc. 26. 24.

κρείττων.

VIII. 6 ('better,' 'more convincing,' of τεκμήρια).

κριθή.

X. 10 (*πέρα μεδίμνου κριθῶν*, the limit of contractual power of a child or woman); XI. 43 (*κριθάς*).—Regularly in the plural.

κρίνω.

XI. 14, 35 (both *κρίνεσθαι*, 'to be prosecuted').

κρίσις.

VIII. 3 ('case' in a law-court).

κτάομαι.

III. 8, 25, 80; V. 4, 7, 8, 30, 35, 36, 41, 43 *bis*, 44, 47; VI. 19, 38; VII. 11; VIII. 9, 35; XI. 48.—*ἐκτησάμην*, 'I acquired': V. 30, 41, 43 *bis*, 47; VI. 19; *κέκτημαι* 'I possess' in the other passages. Note V. 7 *ἐκέκτητο δώδεκα ἔτη*, 'remained for 12 years in possession of'; V. 35 *οὔτε ἀργύριον ὁμολογει κεκτῆσθαι*, 'that he has saved money out of it' (F.).

κτῆμα.

V. 43; VII. 31. Both plural: 'possessions.'

κτήσιος.

VIII. 16.—A cult title given to Zeus as the guardian of the family possessions.

κτῆσις.

V. 42 *πολλοῖς ὡς ἀπὸ ἰδίας κτήσεως*, 'numerous, indeed, to have been provided out of a private fortune' (F.); VIII. 16 *ὑγιείαν καὶ κτῆσιν ἀγαθήν*, 'good health and material prosperity.'

κυέω.

VIII. 36 *ἐξ αὐτοῦ κυεῖν*, 'to be with child by him.'

κύριος.

I. 10 *bis*, 24, 26, 34, 40, 42, 43, 45, 46; II. 26, 46, 47; III. 2, 3; IV. 14; V. 1, 10, 25 *bis*; VI. 4 *bis*, 30, 32, 43, 52;

VII. 13, 20, 34, 41; VIII. 20, 31 *bis*, 37; IX. 7; X. 2, 12 *bis*, 13, 22 *bis*, 23; XI. 2, 9, 12, 16, 42; fr. 29 (1 F.).—The most frequent meaning is 'in control of,' 'master of' property; next comes 'valid' (of a will, I. 24, 26, 34, 42; IV. 14; IX. 7; X. 22 *bis*; of intentions, I. 43, 46; VII. 41; XI. 9: of a law, II. 26; of an adoption, VII. 20; of an agreement, V. 1, 25 *bis*). It denotes a woman's legal representative in III. 2, 3; V. 10; VI. 4 (2nd), 32; XI. 16; the dicasts' power to decide in II. 47; VI. 4; and legal capacity in VI. 52; VIII. 31.

κυρίως.

VII. 24, 26; X. 13; XII. 12. 'Validly.'

κωλύω.

VI. 25, 52; VIII. 25, 26, 37; IX. 11; X. 10: XI. 28, 31, 34; fr. 130 (34 F.), 132 (36 F.).—The only case worth noting is X. 10 ὁ γὰρ νόμος διαρρήδην κωλύει παιδὶ μὴ ἐξεῖναι συμβάλλειν μηδὲ γυναικὶ πέρα μεδίμνου κριθῶν, 'for the law expressly forbids minors and females to make contracts going beyond a bushel of barley in value.' The odd phrasing may be taken from the law to which Isaeus refers. There seems to be no parallel for μή after κωλύω, but there is at least one with διακωλύω, viz. Lysias 20. 36 οὓς εἰκὸς ἦν διακωλύειν μὴ σώζεσθαι.

κωμάζω.

III. 14 ἐπὶ γαμετὰς γυναῖκας οὐδεὶς ἂν κωμάζειν τολμήσειεν, 'to serenade' (F.).

κῶμος.

III. 13 ('serenades').

(*To be continued.*)

W. A. GOLIGHER.

THE COMPENSATION OF ERRORS IN THE METHOD OF FLUXIONS.

NEWTON based his theory of fluxions on the infinitesimal, which Berkeley interpreted as a zero-increment, and which accordingly he attacked as being self-contradictory. Berkeley's main point was that Newton could not logically introduce increments and then make them vanish if he wished to retain the mathematical effects created by those increments. Nevertheless, in spite of its invalid nature the method of fluxions when applied to geometry produced correct results. That this should be so, when the method is invalid, is extraordinary; and to the interesting question why it should be so, Berkeley was apparently the first to address himself. "And, forasmuch as it may perhaps seem an unaccountable paradox that mathematicians should deduce true propositions from false principles, be right in the conclusion and yet err in the premisses; I shall endeavour particularly to explain why this may come to pass, and show how error may bring forth truth, though it cannot bring forth science."[1] His explanation was that Newton's method contained opposite errors, which cancelled out. This thesis of "a compensation of errors" was later advanced independently by Lagrange, Carnot, and Jourdain, and possibly suggested or hinted at by Maclaurin and Fiorentino.

Berkeley was not at all concerned to deny the correctness of the results obtained,[2] but he did insist on strict demonstration[2]: "Whether there be not a way of arriving at truth, although the principles are not scientific, nor the reasoning just? And whether such a way ought to be

[1] G. Sampson: *The Works of George Berkeley*, Vol. III, London, 1898, *The Analyst*, § 20; cf. T. E. Jessop: *Berkeley's Principles of Human Knowledge*, London, 1937, § 132.

[2] *Id.*, §§ 19–20; cf. Jessop: *Op. cit.*, § 131.

called a knack or a science?"[3] Little was Berkeley aware of the knock-out blow he could have delivered had he but known that there actually is a false result that can be obtained by the use of infinitesimals. If the reader should feel that minute logical criticism of a method that works universally is somewhat carping and not to be taken to heart, he may be invited to consider the following beautiful example.[4]

The tangent-plane at a point P on a surface passes through all "neighbouring points" on the surface, where "neighbouring points" are points at *infinitesimal* distances from P. In particular, let it contain a point P'. Similarly the tangent-plane at P' will pass through P. Hence the two tangent-planes contain P and P', and so their line of intersection is the straight line PP'. This is in certain cases absolutely false; for, if we consider two tangent-planes at any two points on a great circle of a sphere, we see at once that their intersection, so far from being the straight line joining these two points, is *perpendicular to it*!

This example, however, is like a museum specimen on account of its rarity, and to assert that the results of the method of fluxions are correct *in general* would be, we might say, a gross under-statement. It remains true that in countless scores of instances the method of infinitesimals works satisfactorily in practice.

Let us now consider Berkeley's thesis of the compensation of errors.

Berkeley expounds his thesis by means of a number of illustrations, which will now be given; but, while pre-

[3] Sampson: *Loc. cit.*, Qu. 35.

[4] For this example I am indebted to Professor C. H. Rowe. I should like to take this opportunity of thanking Professor Rowe for the careful comments he has been good enough to make on this paper. Of his help I have taken full advantage, not only in matters of detail but particularly as regards his constructive criticism of the positive contribution given at the end.

serving the material of his mathematical exposition, I propose for simplicity to rearrange it very considerably. I have in places altered Berkeley's notation to bring it up to date, and have redrawn his figures so as to conform with current conventions about axes. If the reader is interested in the question of mathematical style, he should turn up *The Analyst*. Berkeley arranged his mathematical work very cumbrously, and took several pages to express what is given below in a dozen equations (and these include consequences not drawn by him). It is probable, however, that his work was no worse in this respect than that of the majority of mathematicians of his time.

Berkeley begins with the subtangent to a parabola.[5] In fig. 1 *OPQ* is a parabola; its axis is the axis of x, and

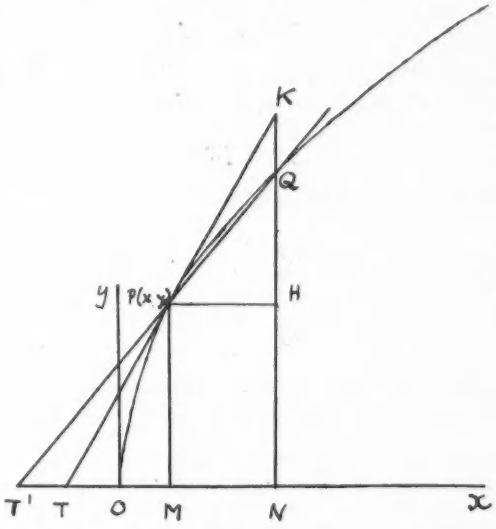

FIG. 1.

[5] Sampson: *Loc cit.*, § 21.

the tangent at its vertex is the axis of y; TP is the tangent at P, whose co-ordinates are (x, y); and Q is the point $(x + dx, y + dy)$; let QK be denoted by z; and let the chord $T'PQ$ and the perpendiculars PM, QN, and PH be drawn.

Berkeley observes that if we make the false assumption that the triangle TMP is similar to the triangle PHQ we shall obtain Newton's expression for the subtangent:

$$TM = \frac{y\,dx}{dy} \tag{1}$$

whereas properly speaking the triangle TMP is similar to the triangle PHK, and an *exact* expression for the subtangent is

$$TM = \frac{y\,dx}{dy + z}. \tag{2}$$

He further observes that if we apply the method of fluxions to the curve OPQ, whose equation is

$$y^2 = px \tag{3}$$

we shall obtain the *inexact* expression

$$dy = \frac{p\,dx}{2y} \tag{4}$$

or

$$dy = \frac{y\,dx}{2x} \tag{5}$$

but, if we do not disregard the second order terms, we shall get the *exact* expression

$$dy = \frac{y\,dx}{2x} - \frac{(dy)^2}{2y}. \tag{6}$$

Now since there is an inaccuracy z in the expression for the subtangent (1) and an inaccuracy $(dy)^2/2y$ in that of the fluxion of the ordinate (5), Berkeley suggests that

there may be a close connexion between them. He proves[6] in fact that

$$z = \frac{(dy)^2}{2y} \tag{7}$$

as follows:—

By the *Conics* of Apollonius (I, 33) we have

$$\frac{dx}{2x} = \frac{dy + z}{y}. \tag{8}$$

Substituting for $dx/2x$ its value from (8) in (6) and solving for z, we get the relation (7) as required. (Berkeley takes nearly a page, including seven lines of mathematical work, to establish this result; he puts it quite clearly however.)

Berkeley's point may be brought out much more strongly than he himself succeeded in doing if we now consider the subtangent in the light of this result (7), for we shall find that its value, $2x$, follows analytically by an *exact* argument. (2) now becomes

$$TM = \frac{y\,dx}{dy + \frac{(dy)^2}{2y}} \tag{9}$$

and, on eliminating dx between (9) and (6), we obtain the result:

$$TM = 2x. \tag{10}$$

This, we may note, would also follow geometrically without the use of (7) by the *exact* process of multiplying together the geometrically based relations (2) and (8). (Berkeley did not draw these conclusions explicitly at all, although they constitute the point at which he was aiming.)

Our immediate concern is to see what happens to the two expressions (1) and (5) of Newton's, which Berkeley

[6] *Id.*, § 22.

regarded as inexact, for (1) omits the quantity z, which Berkeley thought it ought to contain, and (5) omits the quantity $(dy)^2/2y$ (now seen to be equal to z), which Berkeley thought it ought also to contain. Is it possible that the two omissions somehow or other cancel one another? This is apparently what happens, for we have only to divide (1) by (5) to obtain the desired result (10).

Since Newton arrives at the *correct* result for the subtangent by combining two expressions, both of which erroneously contain—or should we say erroneously *omit*?—the same quantity, we have Berkeley's thesis[7] that in the combination equal and opposite errors cancel out—and an ingenious thesis it is.

For the sake of clarity we should ask what kind of quantities these cancelling errors are. For there are two possibilities: that they are both *analytical* expressions which disappear when the two equations erroneously containing (or erroneously omitting) them are suitably combined (*i.e.*, they disappear either by division or by subtraction); and that one is an *analytical* expression which when erroneously made to vanish is balanced by the simultaneous vanishing of an equivalent error in a *geometrical* figure.

It is evident that in the foregoing illustration, both errors were analytical: one was the second-order term dismissed by the method of fluxions; the other was the second-order term z or QK which was ignored in taking the differential triangle to be similar to the triangle formed by the ordinate, tangent, and subtangent.

Berkeley, however, also discusses the subtangent property geometrically by allowing a secant to become a tangent,[8] and explicitly maintains that there is in this treatment but one analytical error and that it is balanced by a geometrical one. His proof is as follows:—

[7] *Id.*, §§ 21, 23, and *passim.* [8] *Id.*, § 24.

Instead of taking the triangle PHQ to be similar to the triangle TMP, as Newton erroneously did, Berkeley correctly takes it to be similar to the triangle $T'MP$. This gives

$$\frac{dy}{dx} = \frac{y}{T'M}. \tag{11}$$

On eliminating dx between (6), (11) and solving for $T'M$ we get

$$T'M = 2x\left(1 + \frac{dy}{y}\right). \tag{12}$$

Now on putting dy equal to zero the right-hand side becomes the correct expression, $2x$, for the subtangent. Here dy is erroneously made to vanish, but the correct value of the subtangent is obtained, Berkeley claims, because this error is balanced by the *geometrical* error of taking $T'M$ to be equal to TM. That is to say, (10) follows from (12), not as we should say nowadays because $T'M$ approaches TM as dy approaches zero, but because the error in crossing out dy is balanced by writing TM for $T'M$. (In this illustration I have altered Berkeley's exposition very considerably so as to use the same form of equation for the parabola. Berkeley, for some reason or other, used the equation $y = x^2$ instead of $y^2 = px$, which he used in the first illustration. Incidentally, Sampson's edition of the *Works* contains two misprints two lines from the bottom of p. 26: "*FM* or *S*" should read "*NM* or *s*"; and Fraser's edition contains the second of these misprints, six lines from the top of p. 35.)

At this point it may occur to us to ask what definition of "tangency" Berkeley adopted and what proof is used in the theorem he cited from Apollonius's *Conics* (I, 33). For Berkeley was critical of the concept of a tangent, defined analytically by putting the infinitesimals dx, dy

equal to zero, and defined geometrically by introducing a secant and making vanish the section of it that forms a chord; but he himself nowhere defined "tangency." It is clear that to be consistent he must have had in mind a different concept from that just described; and, moreover, that the theorem he borrowed from Apollonius must likewise have been based upon a different definition of "tangency." As it happens, the concept used by Apollonius could be consistently used by Berkeley. The reader that wishes to take this subsection on trust may, therefore, without losing the thread of the argument pass on to page 59. Seeing that these considerations, however, might well have made an awkward pitfall, and that they are themselves very interesting, it seems worth while dealing with them.

Discussion of these two points will be interwoven. In (8) Berkeley cited Apollonius as proving that the subtangent to a parabola is bisected at the vertex (the property is more general, but this is all that is relevant). Now it cannot but occur to us that this property as expounded to-day[9] is deduced by means of the theorem that the tangent to a conic from a point on the directrix subtends a right angle at the focus,[10] which Berkeley could not accept. Taylor's proof may be given as follows. If a chord through two *adjacent* points P, Q on the conic whose focus is S cuts the directrix in R, it is then (to use a well worn mathematical phrase) easy to see that SR bisects the angle that SQ makes with PS produced. Now *as Q approaches P, PQR becomes a tangent* at P, and the two angles, which remain equal, *become right angles.* Berkeley, of course, could not admit this proof because the property by which the result is obtained disappears when Q coincides with P, and the result is the ghost of a departed theorem.

[9] Cf. C. Taylor: *The Elementary Geometry of Conics*, Cambridge, 1880, § 24.

[10] *Id.*, § 7.

We are, therefore, curious to know how Apollonius proved the subtangent property so as to satisfy Berkeley, and we are struck at the same time with the need for a Berkeleian definition of tangency; for the ordinary definition as the limiting position of a chord through two neighbouring points obviously could not satisfy him.[11] As it happens, Apollonius is good on both considerations. Let us take the tangent first.

The source for Apollonius that I have used is Sir T. L. Heath's beautiful modern edition,[12] which, incidentally, corresponds to his equally beautiful edition of Euclid's *Elements*, the system of geometry that Apollonius took as his basis. I could find no definition of tangency; but from the implications of Apollonius (I, 17, 32)[13] I venture to offer the following:—*A straight line is a tangent to a conic at a point P if* (i) *no point on it lies inside the conic, and* (ii) *no other straight line can be drawn through P without passing inside the conic.* This, however, gives rise to the question: What is meant by "inside the conic"? Evidently the meaning is that a point is inside a conic if no straight line can be drawn through it without cutting the conic. Condition (i) is, therefore, equivalent to Euclid's definition that it is a straight line that meets a conic (Euclid, of course, confined himself so far as his extant works are concerned to circles) but that on being produced does not cut it. This notion certainly seems to be different from that of the limiting position of a chord through neighbouring points, and it would seem to be satisfactory for Berkeley's purposes. As regards condition (ii), it is interesting to note that Apollonius did not assume there could be only one tangent at a point: that is to say, in

[11] In confirmation of this cf. Sampson: *Loc. cit.*, § 24.

[12] T. L. Heath: *Apollonius of Perga: Treatise on Conic Sections*, Cambridge, 1896.

[13] *Id.*, p. 22, Proposition 11.

his own medium he was aware of an important feature of the differential calculus that dy/dx might not be unique.

Let us turn now to Apollonius's proof of the subtangent property.[14]

In fig. II, if on a diameter of a parabola XPQ a point T is taken outside the curve such that $TX = XM$, where M is the foot of the ordinate from P to the diameter XM, the straight line TP will touch the parabola.

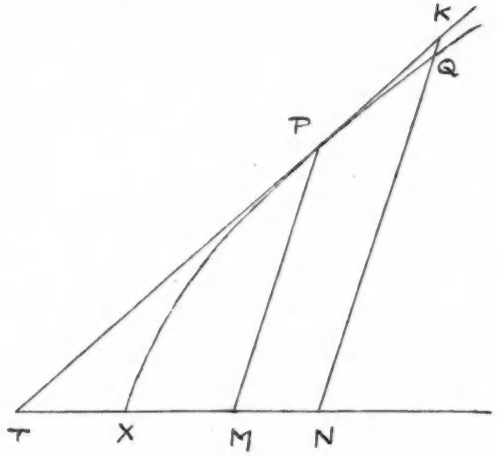

FIG. 2.

We have to prove that the straight line TP or TP produced does not fall within the curve on either side of P.

If possible, let K, a point on TP or TP produced, fall within the curve; through K draw KQN parallel to an ordinate and meeting the diameter in N and the curve in Q. We have

$$\frac{XN}{XM} = \frac{QN^2}{PM^2} > \frac{KN^2}{PM^2} = \frac{TN^2}{TM^2} = \frac{TN^2}{4TX \cdot XM}$$

[14] *Id.*, p. 25, Proposition 12.

so that $4TX \,.\, XN > TN^2$; but, since by hypothesis TN is not bisected at X, $4TX \,.\, XN < TN^2$—which is absurd. Hence TP does not at any point fall within the curve, and is, therefore, a tangent. (Apollonius does not prove that TP conforms to the condition (ii), which I suggested above should form part of the definition of "tangency"; but it would be easy to supply the deficiency by means of one of his preceding theorems.)

In this there is nothing to which Berkeley need take exception.

In addition to his two discussions of the subtangent, Berkeley gave a third illustration of his thesis, which is of peculiar interest because it reveals certain weaknesses in Berkeley's mathematical powers.

The problem is: being given the area under a curve, to find the ordinate—to prove in fact that the ordinate is the fluxion of the area. Thus (if we refer to fig. I) being given

$$\text{fig. } OPM = x^2 \qquad (13)$$

it is required to find PM. In this case I follow Berkeley's notation in which he uses o for the increment dx or PH. According to him, we may put

$$\text{fig. } PQH = q \,.\, o^2 \qquad (14)$$

(he does not explain why, and afterwards asserts that q is obviously equal to unity). We then have

$$\text{fig. } OPM + \text{fig. } PN + \text{fig. } PQH = \text{fig. } OQN \qquad (15)$$

or

$$x^2 + y \,.\, o + q \,.\, o^2 = (x + o)^2. \qquad (16)$$

Hence

$$y \,.\, o + q \,.\, o^2 = 2x \,.\, o + o^2 \qquad (17)$$

or

$$y + q \,.\, o = 2x + o. \qquad (18)$$

Now, he says, "supposing o to vanish," we get the correct value of the ordinate:

$$y = 2x \tag{19}$$

and he correctly remarks that OPQ will become a straight line and the figures OPM, PQH triangles. He argues as before that it is not valid to allow o to vanish, but asserts that the reason why the correct result follows is because

$$q = 1 \tag{20}$$

—because, as he puts it, "q being unit, qo is equal to o." That is to say, no error occurs in the result because the two quantities erroneously put equal to zero balance one another.

Berkeley throws no light on the assumptions (14), (20). They seem to be pure mistakes except where OPQ is a straight line. It is very difficult, moreover, to understand why he introduced q at all when its value was supposed to be unity. Attention has never, so far as I am aware, been drawn to these points.

A strange feature of the argument is that the area OPM, when its value is x^2, is a triangle; and the argument is obviously valid for a triangle. It would seem that Berkeley thought out the example in terms of the special case of a straight line, for which (14), (20) are both true, then sought to make the illustration more general by replacing the straight line by a simple curve, but forgot to look for any alterations in his equations that such a change might necessitate.

Berkeley generalises this illustration.[15] If

$$\text{fig. } OPM = x^n \tag{21}$$

the method of fluxions gives the ordinate as being

$$y = nx^{n-1} \tag{22}$$

[15] Sampson: *Loc. cit.*, § 28.

and Berkeley wishes to show what condition must hold if this is so.

We have

$$\text{fig. } PMQ = \text{increment of } x^n \qquad (23)$$

so that

$$\text{fig. } PN + \text{fig. } PQH = nox^{n-1} + \frac{nn - n}{2} oox^{n-2} + \&c. \qquad (24)$$

(Newton, it will be recalled, divides by o equal to MN and equates o to zero.) Now according to Berkeley we shall obtain the result (22) only if we admit that

$$\text{fig. } PQH = \frac{nn - n}{2} oox^{n-2} + \&c. \qquad (25)$$

so that the vanishing of the second-order quantity on the right, which he calls "rejectaneous," shall be equalised by the simultaneous vanishing of the area PQH. If (25) is granted, then (22) follows in accordance with the maxim[16]:

> *If from equals you subduct equals, the remainders will be equal.* (26)

Here again we find that the exact result is obtained because the geometrical error that arises from ignoring the area PQH is exactly balanced by the analytical error that comes from ignoring the "rejectaneous" quantity of the second order just mentioned.

From this illustration it would seem that Berkeley had a limited taste for mathematical generality; for he offers no proof, as he ought, of (25), but contents himself with the assertion that this must be so if the method of fluxions is to produce the correct result.

Before reaching a final conclusion on the validity of Berkeley's view, let us trace its subsequent history. For

[16] *Id.*

this the mathematical authorities cited above in various places have not maintained their standard of scrupulous accuracy and attention to detail. Thus Cajori tells us that the view was advanced by Lagrange and Carnot,[17] but he gives no reference; again he says: "Mr. Philip E. B. Jourdain has found clear indications of this theory in Maclaurin's *Fluxions* and in Lagrange's *Théorie des fonctions analytiques*,"[18] but again no reference. I have not been able to find Jourdain's comments in this connexion on Maclaurin (Jourdain was a very prolific writer; it would, therefore, be a mistake to infer that such references to Maclaurin do not exist simply because I have not been able to find any), but for his observations on Lagrange and Carnot he cites Vivanti as his authority. He simply states that Berkeley's "theory was rediscovered, apparently independently of others and of each other, by Lagrange and Lazarre Carnot in 1797."[19] Carnot's work on the subject is readily accessible, for he explicitly expounded it, and in a most elegant way, in a very interesting little volume.[20] Lagrange devoted only a note of a couple of pages to the topic,[21] but they are to the point; they—and Carnot's work—are mentioned by Vivanti.[22] Vivanti also refers to a similar suggestion made by the eclectic, Niccola Fiorentino, who in 1782 put it forward in his work:

[17] Cajori: *A Hist. of Math.* (*supra cit.*), p. 219.

[18] Cajori: *Hist. Concep. Limits* (*supra cit.*), § 224.

[19] P. E. B. Jourdain: "Mathematicians and Philosophers," *The Monist*, Vol. 25, Chicago, 1915, pp. 634/5.

[20] L. N. M. Carnot: *Réflexions sur la métaphysique du calcul infinitésimal*, Tome II, Paris, 1921; Eng. trans.: *Reflexions on the Metaphysical Principles of the Infinitesimal Analysis*, Oxford, 1832. The translation does not cover the whole of the original, and in what follows the French version will be used only where no translation exists.

[21] M. J.-A. Serret: *Œuvres de Lagrange*, Tome VII, Paris, 1877: "Note sur la métaphysique du calcul infinitésimal," pp. 597–9.

[22] M. Cantor: *Vorlesungen über Geschichte der Mathematik*, Bd. IV, Leipzig, 1908: Cap. XXVI, "Infinitesimalrechnung," von G. Vivanti.

Saggio sulle quantità infinitesime e sulle forze vive e morte.[23]

Maclaurin probably did not give the matter his explicit attention, but the following passage may be held to contain a hint of the view[24]:—"When we investigate the first differences, we may reject the infinitesimal parts of the element [among other reasons] because in measuring these motions at any term of the time, the infinitesimal parts of the element are not to be regarded, since they are not generated in consequence of these motions themselves, but of their variations from that term . . . The same infinitesimal parts of the element however may serve for measuring the acceleration or retardation of those motions from that term, or the powers which may be conceived to accelerate or retard them at that term: and here the infinitely small parts of the element that are of the third order are neglected for a similar reason, being generated only in consequence of the variation of those powers from that term of the time." Maclaurin would seem to imply the thesis here discussed by his remark to the effect that, when finding, say, a velocity, second-order quantities are to be disregarded because they correspond to deviations from the actual velocity.

Lagrange's views must be expounded fully.[25] In his opinion the calculus consists in seeking a general formula for tangents, and in rejecting relatively small terms; hence the process is rigorous and exact only if there is an error in its basis that cancels the error due to the rejection of the small quantities. This he illustrates with reference to the notion of a curve considered as a polygon with an infinite number of sides, each of which on being produced becomes a tangent to the curve. "Cette supposition est

[23] See Cantor: *Loc. cit.*, S. 661/2. I have not seen this work of Fiorentino's.

[24] C. Maclaurin: *A Treatise of Fluxions*, Edinburgh, 1742, § 501.

[25] See Serret: *Loc. cit.*

réellement fausse, car le petit côté prolongé ne peut jamais être autre chose qu'une véritable sécante; mais l'erreur est détruite par une autre erreur qu'on introduit dans le calcul en y négligeant comme nulles des quantités qui, selon la supposition, ne sont qu'infiniment petites. C'est en quoi consiste, ce me semble, la métaphysique du calcul des infiniment petits, tel que l'a donné M. Leibnitz. La méthode de M. Newton est au contraire tout à fait rigoureuse, soit dans les suppositions, soit dans les procédés du calcul; car il ne conçoit qu'une sécante devienne tangente que lorsque les deux points d'intersection viennent tomber l'un sur l'autre, et alors il rejette de ses formules toutes les quantités que cette condition rend entièrement nulles." [26] Lagrange adds that, whereas the introduction of quantities only to make them vanish makes the method long and complicated, the supposition of infinitesimals shortens and simplifies the procedure. But this is permissible only after we have proved that the error they occasion is always corrected by the assumption that infinitesimals are realities. Exactly how this is so is best understood by reference to Berkeley's examples: the error introduced into a mathematical function by infinitesimals is corrected by that brought about by taking small elements of a curve to be straight lines; the latter error is the geometrical reality to which infinitesimals correspond—it is in this sense that infinitesimals are to be considered realities. Evidently Lagrange was at one with Berkeley in accounting for the correctness of the infinitesimal calculus by means of opposite errors that cancelled out. *But Lagrange regarded fluxions as valid when so based, whereas for Berkeley this basis revealed the illogical nature of fluxions; the one was explaining how a difficult though accurate theory worked, the other how an inaccurate theory succeeded in practice.* It is clear that Lagrange did

[26] *Id.*, p. 598.

Newton more than justice: crediting Newton with the implicit premiss that second-order quantities were not to be ignored but mutually balanced; whereas Berkeley was right in implying that no such premiss could be found in Newton's method.

Let us now consider Carnot's account, which closely resembles Berkeley's but is less uncompromising; in fact so far as he adds anything to the philosopher's thesis he reverts without justification to the Newtonian position.

In fig. III[21] TP is a tangent at $P(x, y)$ to the circle

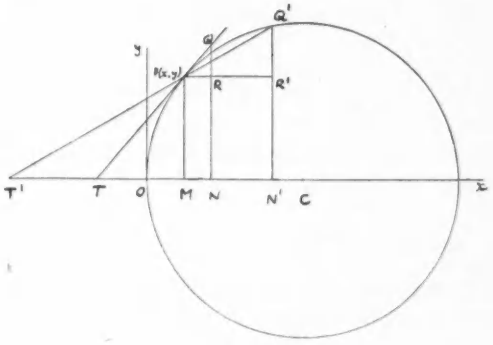

FIG. 3.

with centre C, and $T'PQ'$ is a chord; Q is a point on the tangent near P; OC is the axis of x and the tangent at O is the axis of y; the co-ordinates of Q, Q' are respectively $(x+h,\ y+k)$, $(x+h',\ y+k')$; and PM, QN, $Q'N'$ are parallel to the y-axis and PRR' to the x-axis. It is required to find the subtangent TM.

Since P lies on the circle,

$$y^2 = 2ax - x^2. \qquad (27)$$

[21] Carnot: Eng. ed. *cit.*, § 3.

Now let us introduce an infinitesimal error by substituting the co-ordinates of Q in the equation of the circle. Thus

$$(y+k)^2 = 2a(x+h) - (x+h)^2. \qquad (28)$$

Subtracting (27) from (28) and rearranging the terms we get

$$\frac{k}{h} = \frac{2a - 2x - h}{2y + k}. \qquad (29)$$

But from similar triangles we have

$$\frac{k}{h} = \frac{y}{TM} \qquad (30)$$

so that

$$TM = \frac{y\,(2y + k)}{2a - 2x - h}. \qquad (31)$$

If now we neglect the infinitesimals h, k, we obtain the expression for the subtangent:

$$TM = \frac{y^2}{a - x} \qquad (32)$$

a result that we could derive accurately from similar triangles by observing that TM is equal to PM^2/CM or $y^2/(a - x)$.

"Let us therefore now see how in the equation (31)[28] . . . it has happened, that in neglecting h, k the truth of the result has not been affected; or rather how this result has become exact by the suppression of these quantities, and why it was not so before. We may very easily assign a reason for what has occurred in the solution of the problem treated above, by remarking, that the hypothesis from whence the reasoning started being false, . . . there ought to have resulted from this hypothesis some error or

[28] As with Berkeley, I have altered Carnot's figure and notation; in the latter respect this and ensuing quotations differ from the originals quoted.

other in the equation (31); and that the result (32) being no less certainly exact, as is proved by the comparison of the two triangles *CPM, PMT,* we may neglect h, k in the first equations, and we are even bound to do it in order to correct the calculation and to destroy the error which the false hypothesis had introduced. To neglect quantities of this nature then is not only admissible in parallel cases, but it is necessary, and it is the only method of expressing exactly the conditions of the problem."[29] "The exact result (32) has then only been obtained by a compensation of errors; and this compensation may be rendered still more apparent, by treating the example given above in a somewhat different manner . . ."[30] For

$$\frac{T'M}{y} = \frac{h'}{k'} \tag{33}$$

or

$$TM + T'T = y\frac{h'}{k'}. \tag{34}$$

Now if $Q'N'$ moves towards PM, always remaining parallel to itself, then in the limit

$$TM = y\frac{h'}{k'} \tag{35}$$

—"the error may be diminished as much as we please"; and

$$\frac{h'}{k'} = \frac{2y + k'}{2a - 2x - h'} \tag{36}$$

which is perfectly exact whatever Q' may be; then neglecting h', k', the error which will result in the equation

$$\frac{h'}{k'} = \frac{y}{a - x} \tag{37}$$

[29] *Id.*, § 8. [30] *Id.*, § 9.

to which $(2y + k')/(2a - 2x - h')$ will be reduced, "may like the first be made as small as shall be deemed necessary. This being the case, without regarding errors which may be always diminished as much as we please, we treat the two equations just found, viz., (35), (37), as if they were both of them perfectly exact; by substituting in the latter the value of h'/k' derived from the other, the result is as above, (32). This result is quite true . . . and yet the equations, (35), (37), from which it was deduced, are certainly both false, since the distance of $Q'N'$ from PM has never been supposed to vanish, nor even to be very small, but really equal to any line arbitrarily chosen. The errors consequently must compensate for one another, by the comparison of two faulty equations." [31] The compensation of the errors "shows itself in the result, by the absence of the quantities h', k', which occasioned these errors . . ." [32] Otherwise expressed, since none of the quantities appearing in the result is arbitrary, it cannot contain h', k', which are arbitrary. Hence to obtain the result, "it remains but to eliminate these arbitrary quantities." [33]

Carnot claims that his method combines the readiness of a simple approximating calculation with the exactness of the most rigorous methods, and that it is nothing more than the method of exhaustion reduced to an algorithm.[34]

However, it would seem that Carnot was not entirely satisfied with this thesis, for he brought forward an additional argument in its support, which was based on what he called *continuity*[35]: ". . . so long as $Q'N'$ does not coincide with PM, the fraction h'/k' is greater than TM/y; these two fractions become equal only when h' and k' become equal to zero. It is true that then h'/k' is as much equal to any other quantity as to TM/y, since 0/0 is an

[31] *Id.*, § 9.
[32] *Id.*, § 10.
[33] *Id.*, § 11.
[34] *Id.*, § 30.
[35] *Id.*, § 87.

absolutely arbitrary quantity: but amongst the different values that we may assign to h'/k', TM/y is the only one which is subjected to the law of continuity, and determined by it . . ."

What does Carnot here mean by "continuity"? Evidently he means something quite different from what mathematicians since the time of Cauchy have understood by the term; his conception seems in fact to be that of steadily or continuously (in an untechnical sense) approaching a limit—his treatment of 0/0, for example, is the same as one of the ways of treating it to-day. If this is so, two criticisms may be made: (i) if a theory of limits is introduced, the thesis of a compensation of errors is no longer required, and Carnot weakened his position in going beyond the view given by Berkeley; and (ii) his presentation of limits is no better than Newton's, and to base the method of fluxions on this would be to leave it exactly where it stood.

Carnot, however, believed that by means of this concept of "continuity" he could deal satisfactorily with the dilemma, first put forward by Berkeley, that infinitesimals are either finite or zero and cannot be both[36]: "far from being unable to consider the infinitely small quantities as neither real nor as nothing, we may on the contrary say, that we can at our pleasure regard them as zero or as real quantities; for those who wish to look upon them as zero, can answer that the quantities which they call infinitely small are not any zeros whatsoever, but zeros assigned by a law of continuity which determines their ratio . . ." This is surely a very remarkable passage: for on the one hand it shows that Carnot was striving after the concept of a limit, but on the other hand it completely begs the question; for whether infinitesimals could be finite or zero according to the need of the moment is precisely the point

[36] *Id.*, § 92.

at issue in the Newtonian method of fluxions. A critic such as Berkeley would have found in this statement of Carnot's material that was even easier to treat with his acute logic than was Newton's own presentation of the subject.

Cantor makes the following criticism of Carnot[37]:—"Der Standpunkt von *Carnot* ist richtig, aber sein Verfahren ist weder so einfach, als es sein dürfte, noch ganz vollständig. Um nachzuweisen dass die ungenauen Gleichungen sich durch Vertilgung der unendlichkleinen Grössen in genaue verwandeln, braucht man *nur* die unendlichkleine Grösse als eine willkürliche Grösse zu definieren; denn, da nach dieser Definition die unendlichkleinen Grössen sich so klein annehmen lassen, dass die aus deren Vertilgung hervorgehenden Fehler kleiner sind als jede beliebig vorgegebene Grösse, so sind diese Fehler genau gleich Null. Es findet also wirklich eine Aufhebung der Fehler statt, nicht aber durch gegenseitige Ausgleichung ('compensation des erreurs'), wie *Carnot* meint, sondern dadurch, dass jeder Fehler für sich selbst zu Null wird. Es ist ferner zu beachten, dass sich *Carnot* mit der Bestätigung der Tatsache von der Fehleraufhebung begnügt, ohne nach deren Grunde zu suchen; hätte er das getan, so hätte er den Grund daren gefunden, dass, wie soeben gesagt, jeder Fehler für sich verschwindet." This criticism is on the whole not unjust—made more precise it could serve as a basis for the differential calculus—but it ignores Carnot's own attempt in the same direction, when in a short section he passed from balancing opposing errors into letting them tend to zero, which if pursued would amount to justifying the method of fluxions on the basis of limits.

It would be a mistake, however, to suppose that Carnot made *no* attempt to justify his position. He claimed—

[37] Cantor: *Op. cit.*, § 650.

and in this he would have had the whole-hearted support of Berkeley—that the method of fluxions was no more unintelligible than the algebraic rule of signs, and he drew a cogent analogy between infinitesimals and imaginary numbers. Naturally one cannot justify one part of mathematics by the difficulties or peculiarities of another part; but Carnot's remarks should not be neglected. Thus[38]: "The metaphysical principle of the rule for signs is much more difficult to discover than that of infinitely small quantities. This rule has never been demonstrated in a satisfactory manner; it does not appear that it can be, and nevertheless it serves as the foundation of all algebra." He also adds the following interesting remarks[39]:—"Il y a une analogie remarquable entre la théorie des quantités negatives isolées et celle des quantités infinitésimales, en ce que les unes et les autres ne sauraient jamais être employées qu'auxiliairement, et qu'elles doivent nécessairement disparaître des résultats du calcul, pour que ces résultats deviennent parfaitement exacts et intelligibles: jusqu'alors ce ne sont que des formes algébriques plus ou moins implicites, et qui ne sont susceptibles d'aucune application immédiate." L'analyse infinitésimale "parvient à son but par des erreurs qui se compensent, l'autre par des hypothèses contradictoires que se corrigent l'une par l'autre. Dans la première, les quantités infinitésimales ne sont que des quantités auxiliaires, qu'il faut nécessairement éliminer pour obtenir les résultats cherchés; dans la seconde, les quantités négatives isolées et les imaginaires ne s'emploient de même qu'auxiliairement et comme des instruments qui deviennent absolument étrangers à l'édifice, une fois qu'il est construit."[40]

Thus Lagrange and Carnot were emphatically of the opinion that Newton's correct results were obtained through

[38] Carnot: *Op. cit.*, § 100.
[39] Carnot: French ed. *cit.*, Note, p. 75.
[40] *Id.*, p. 104.

a compensation of errors.[41] In recent times this has had the assent of Jourdain[42]; he does no more, however, than repeat Carnot. Thus, of those who did devote themselves to the problem, we see that Berkeley forestalled eminent mathematicians with the thesis of the compensation of errors. His form of explanation was more satisfactory than that of the celebrated Lagrange; and it was better than that of Carnot, so far as it differed from this, in being uncompromising. It is curious that few mathematicians should have considered this interesting subject worth writing about. That the greatest of all mathematical techniques should have been eminently successful, though based on a false supposition, might have been expected to attract attention. It will be suitable, therefore, to discuss the matter from a fresh angle.

What, in a word, was Berkeley's thesis? It was that Newton introduced finite increments in order to obtain certain effects and then crossed them out, while retaining their effects; and that in crossing out these finite increments Newton made two errors which balanced. It was that infinitesimals were not either finite or zero according to the exigencies of the moment. However ingenious an explanation this was of the extraordinary power of the method of fluxions to produce correct results by an invalid process, it is too crude. It is surely beyond credence that a universal process should continually make errors that by balancing should not disturb the equilibrium of its results. It would be as if a doctor habitually gave an overdose of

[41] How far these writers were aware of the literature on the subject is difficult to say. Vivanti inclines to the view that their opinions were reached independently (Cantor: *Op. cit.*, S. 648 n.), but according to Mr. Boyer "... the substance of the Berkeley-Jurin-Robins controversy was known to mathematicians on the Continent" (Carl B. Boyer: *The Concepts of the Calculus: A Critical and Historical Discussion of the Derivative and the Integral*, New York and London, 1939, p. 246).

[42] Jourdain: *Op. cit.*, p. 634, and *The Nature of Mathematics*, London and Edinburgh, 1919, p. 95.

a dangerous drug that through its strength caused every patient without exception to sneeze slightly and spill some so as to swallow only the correct dose.

There would seem to be three ways in which the success of the method of fluxions might be explained. It might be justified by the modern correct theory of limits. This, however, is not the case; for all the aid that this theory can render Newton is to prove rigorously that his results were in fact correct, but it cannot justify his method. The only other ways, it seems to me, would consist in showing that Newton either made a true assumption which was justifiable or made a false one which was not required—or both. To examine these possibilities will require some detailed mathematics.

Consider the function $f(x)$ and form the function

$$\frac{\delta f}{\delta x} = \frac{f(x + \delta x) - f(x)}{\delta x}. \qquad (38)$$

If this function approaches a limit (without raising the question whether it *attains* this limit) then this limit is to be defined as the derivative of $f(x)$, which we shall write $f'(x)$. This we may express:

$$f'(x) = \lim \frac{f(x + \delta x) - f(x)}{x}, \text{ for } x \neq 0, \text{ as } x \to 0. \qquad (39)$$

This procedure, unlike Newton's, is not open to Berkeley's objections. Now the question arises of giving a meaning to a function's *attaining* its limit. We nowadays say that $F(x)$ attains the limit L, which $F(x)$ approaches as x approaches a, if $F(a)$ exists and is equal to L. It is evident that the definition is without significance unless $F(a)$ is defined otherwise than as the limit of $F(x)$ as x approaches a. In the same way we must say that $\delta f/\delta x$ attains its limit $f'(x)$ if $\delta f/\delta x$ is equal to $f'(x)$

when δx is equal to zero. In form, however, $\delta f/\delta x$ is identically equal to $0/0$ if δx is zero, so that $\delta f/\delta x$ is indeterminate and does not attain its limit; to divide by δx when it is equal to zero is not a legitimate process.

It may happen, however, that δf is algebraically divisible by δx, as, for example, is the case with polynomials; for, if $f(x)$ is a polynomial, it follows by the remainder theorem that $f(x + \delta x) - f(x)$ is a polynomial containing δx as a factor, and has the form $\delta x \,.\, P(x, \delta x)$. Let us suppose that the division of this function by δx is carried out, so that the incrementary ratio is $P(x, \delta x)$. If we go on to consider what happens when δx *is equal to zero,* we are not now introducing δx into $f(x)$ and then putting δx equal to zero—which was what called forth Berkeley's strictures—but considering an *"Ersatz"* function —one just as good but not the same as the original brand— and asking what happens to it in the special circumstance where δx *is equal to zero.* We are just as entitled to do this as to consider the value of any function at some particular point. The result is that $P(x, \delta x)$ attains its limit $f'(x)$.

We, therefore, evade Berkeley's criticisms by replacing the Newtonian procedure of putting δx equal to zero by two distinct processes: (1) of defining $f'(x)$ as the limit of $\delta f/\delta x$, for δx other than zero, as δx approaches zero; and (2) by treating the attainment of this limit as an entirely separate consideration. It must be observed, however, that $P(x, \delta x)$ is a different function from $\delta f/\delta x$— different in the single respect that it is defined for $\delta x = 0$ while $\delta f/\delta x$ is not. It will be seen that considerations of a similar kind may be applied to algebraic functions.

I would suggest that the reason why Newton's method of fluxions produces correct results for such functions as polynomials can be answered in the following way.

He did not need to consider whether $\delta f/\delta x$ attained its limit or not; for his purposes he simply required the limit

$f'(x)$, irrespectively of whether or not it was attained (there is good reason for thinking that Newton—as opposed to Robins—believed that the limit was attained, but that need not concern us here). Now this limit was derived by putting δx equal to zero, instead of letting δx approach zero, if and only if the limit was attainable; hence Newton's obtaining the right fluxions by bad reasoning depends for its success upon the circumstance that to the incrementary ratios of these functions correspond "*Ersatz*" functions which attain their limits.

We have, then, two classes of functions: (i) those whose increments contain the increment of the independent variable as an algebraic factor in the sense that we have explained—that is, polynomials and the like, in which δf contains δx as an algebraic factor; and (ii) those whose increments do not fulfil this condition. $\delta f/\delta x$ attains the limit $f'(x)$ for the first class but not for the second. (We shall regard it as permissible to use the "*Ersatz*" function in order to say that $\delta f/\delta x$ attains its limit.)

Corresponding to these two classes of functions, there are two aspects of Newton's position to be considered: his justifiable procedure for the former of putting δx equal to zero; and his notion of ultimate ratios or the ratios with which the increments vanished. From all that has preceded it should now be clear that $\delta f/\delta x$ has a meaning and a value for δf, δx equal to zero only if δf contains δx as a factor, *i.e.*, if $\delta/\delta x$ attains its limit $f'(x)$. If Newton's vague notion of ratio of evanescent quantities refers to such a function $\delta f/\delta x$, it can be allowed the precise meaning just given. But for functions of the second class, where δf is not divisible by δx, it cannot be given this meaning; and there remains only one way of rendering it significant, which is by Cauchy's definition of a "limit." Now one thing seems certain: that Newton did not foresee Cauchy's approach. According to Newton,[43]

[43] Florian Cajori: *Sir Isaac Newton's Mathematical Principles of Natural Philosophy*, Cambridge, 1934, Bk. I, Sect. I, Lemma I, p. 29.

"Quantities, and the ratios of quantities, which in any finite time converge continually to equality, and before the end of that time approach nearer to each other than by any given difference, become ultimately equal." For[43]: "If you deny it, suppose them to be ultimately unequal, and let D be their ultimate difference. Therefore they cannot approach nearer to equality than by that given difference D; which is contrary to the supposition." The proof here offered makes it clear that Newton conceived of but two states for ultimate quantities, equality and inequality; he did not allow the possibility of there being no such quantities. In fact he explicitly rejected this[44]: "Perhaps it may be objected, that there is no ultimate proportion of evanescent quantities; because the proportion, before the quantities have vanished, is not the ultimate, and when they vanished, is none. But by the same argument it may be alleged that a body arriving at a certain place, and there stopping, has no ultimate velocity; because the velocity, before the body comes to the place, is not its ultimate velocity; when it has arrived, there is none. But the answer is easy; for by the ultimate velocity is meant that with which the body is moved, neither before it arrives at its last place and the motion ceases, nor after, but at the very instant it arrives; that is, that velocity with which the body arrives at its last place, and with which it ceases. And in like manner, by the ultimate ratio of evanescent quantities is to be understood the ratio of the quantities not before they vanish, nor afterwards, but with which they vanish." This passage could hardly have been more obscure; but the intention to defend the existence of ultimate ratios seems clear. Let us now try to interpret the trend of Newton's thought, making explicit what was with him but dimly conscious or not conscious at all.

[44] *Id.*, Bk. I, Sect. I, Scholium to Lemma XI, pp. 38/9.

With the class of functions whose increments were multiples of δx, he found by trial that δx could be put equal to zero, and was thus led to think that $\delta f/\delta x$ had a value even when δf, δx were both zero. When he came to functions, such as the sine, it was necessary to know the limit of $(\sin \delta\theta)/\delta\theta$; it was easy to see that this became closer and closer to unity; hence it was natural to suppose this ratio behaved like the former, and had a value even when $\sin \delta\theta$, $\delta\theta$ were both zero, and to describe this value as that with which its constituents vanished.

If so, Newton was guilty of an error; but it is plain that the error was not one to lead to subsequent mistakes, simply because what is important in the differential calculus is the *existence* of a limit of the incrementary ratio and not its *attainment*. Newton thus said too much: his error consisted in making an assumption that was not needed and not used. So far as the differential calculus is concerned, Robins, who uncompromisingly denied that any function attained its limit, was more in the right than Newton—after all the incrementary ratios of polynomials, for instance, attain their limits only by the introduction of an "*Ersatz*" function for $\delta f/\delta x$ in which the division by δx is carried out.

To summarise: Newton's procedure for functions whose increments contain δx as a factor was not incorrect, but it required a subtle justification, namely, that

$$\lim_{\delta x \to 0} \frac{\delta f}{\delta x} = \left(\frac{\delta f}{\delta x}\right)_{\delta x = 0} \tag{40}$$

where the latter part is defined through the "*Ersatz*" function; his procedure for other functions was not correct, but what was false was a superfluous assumption which was not actually used. It is thus plain that for the early writers on the differential calculus, except perhaps Robins, an infinitesimal was a zero-increment, *i.e.*, had the contradictory properties of being zero and being finite, and

that they used the former (superfluously but harmlessly) because they did not know how to obtain the same results by means of the latter property alone.

Berkeley's answer to the problem was quite different; his thesis of the compensation of errors was designed to explain the correct *application* of derivatives, in which *one error inherent in a fluxion was equalised by another error in its application*; but the thesis did not claim that derivatives themselves were accurate results obtained by balancing errors. *Berkeley attempted to explain, not that derivatives though invalidly reached were correct, but that though inaccurate they led to correct results* IN GEOMETRY. Thus he regarded the derived functions as inaccurate, whereas here we regard them as loosely obtained but accurate. It is clear that, if derivatives can be obtained validly by any method, one of the errors discussed by Berkeley is non-existent; hence there cannot be *two* errors to compensate in a geometrical application but only one (if any), and the thesis of the compensation of errors falls to the ground. It follows that the differential calculus of to-day, as founded on limits, does not owe its practical success to cancelling errors. But if the method of fluxions could not be presented in a valid way, Berkeley's thesis might well apply to it. I have suggested above a way by which Newton's procedure might be analysed so as to avoid the error attributed to it by Berkeley; it remains to show how derivatives may be applied to geometry also without creating an error. This is done by means of the *differential.*

Let us define a differential dy in the usual way, namely, by the product of the derivative $f'(x)$ and the finite increment δx; thus

$$dy = f'(x)\delta x. \qquad (41)$$

For the particular case where $f(x)$ is x itself, $f'(x)$ is unity,

and dy becomes dx, so that dx is equal to δx. Hence

$$dy = f'(x)dx. \qquad (42)$$

If we look back at fig. I, and interpret the increment PH as a differential dx, it follows from (42) that HK must represent the differential dy. Let us see, then, how far we can interpret Newton's equations in terms of differentials.

The equation (1) at once becomes exact. But we have just seen that (5) also, when based on limits, is exact; hence we can derive the subtangent by combining these two exact equations instead of, as Berkeley thought, by discovering that they were both inexact and that their errors cancelled. According to this interpretation, Berkeley's thesis of balancing errors is not needed. Moreover, dx, dy in (5), since (5) is exact, *must* now be capable of being interpreted as differentials.

But Newton did not know what a differential was, and in fact he used dy not for HK but for HQ. Upon what basis, therefore, can we interpret his equations in terms of differentials?

Let us rewrite (1) as formed by Newton, where Q is the point $(x + \delta x, y + \delta y)$:

$$TM = \frac{y\,\delta x}{\delta y} \qquad (43)$$

which is inexact. And let us write the exact form of (1), where dx, dy are differentials:

$$TM = \frac{y\,dx}{dy}. \qquad (44)$$

Now it is quite clear that (10) follows exactly, if (5) is exact, only if (44) is used instead of (43). Hence Newton, though he began with (43), must have used (44), and it is not difficult to see how this could have come about. For in the use of equations such as (43), the increments δx, δy were *infinitesimal*, or supposed to approach zero;

hence (44) would validly have replaced (43) when δx, δy were infinitesimal, if $\delta y/\delta x$ approached the limit dy/dx, *i.e.*, if the ratio of the infinitesimal increments approached the ratio of the differentials. Thus all that is required to justify Newton's method of obtaining the subtangent is the premiss:

$$\frac{\delta y}{\delta x} \to \frac{dy}{dx} \text{ as } \delta x \to 0. \tag{45}$$

Thus Newton's geometrical results were in a sense due to a cancellation of errors, not in the sense described by Berkeley, but in the sense that he introduced an unnecessary error, which he minimised, but got rid of only by sleight of hand in the absence of (45).

If we view this matter geometrically, supposing that Newton really regarded the tangent at P (fig. I) as the limiting position of the chord PQ; then for this chord the equation

$$T'M = \frac{y\,\delta x}{\delta y} \tag{46}$$

would be exact. But, as δx approaches zero, $T'M$ approaches TM, so that—subject to (45)—(46) becomes (44). Hence the matter considered from this angle is much the same—Newton implicitly used (45).

Let us summarise the present thesis. Newton's method of fluxions, based on infinitesimals or zero increments, *i.e.*, increments that were introduced only to be crossed out, can be justified and steered through the mine-field of Berkeley's criticism for a certain class of functions by analysing the process of putting the infinitesimal equal to zero into the two processes of letting it *approach* zero *without becoming* zero and then of discussing as a separate case what happens when the increment, after being actually

divided into the numerator of the incrementary ratio, is regarded as a new independent variable and made to vanish; the infinitesimal is justifiable and analysable in this way only for functions whose increments contain it as a factor. But for other functions the method of fluxions cannot be justified, since for them it assumes what is not true, that 0/0 has a meaning; this assumption is not however needed, and if not actually used does not prevent the method from producing correct results.

Thus actual fluxions did not contain errors which had to be balanced by other errors when the fluxions were applied to geometry. Hence Berkeley's thesis, based on the supposition that actual fluxions were inexact, that such applications involved compensating errors, is needless; and the only error of which Newton was guilty in the sphere of geometry was of using an exact form that was the limit of an inexact expression without knowing that this limit really was the limit of the inexact expression.

Thus Newton's errors were of three kinds: (i) proceeding to the limit upon an unavowed premiss; (ii) stating a meaningless principle which he did not require; and (iii) applying fluxions to geometry without introducing a vital premiss.

It is urged that this way of looking at the matter makes it less of a mystery why the invalid method of fluxions should have had such uniformly excellent results.

If this thesis is correct, then Berkeley's ingenious attempt to explain the fruitfulness of the method of fluxions, and the similar attempts by the other more celebrated mathematicians that took the same view, Lagrange, Carnot, and Jourdain, must be rejected.

J. O. WISDOM.

THE NECESSITY OF IMMATERIALISM.

"I PUBLISH not this so much for anything else as to know whether other men have the same ideas as we Irishmen." So wrote George Berkeley in 1706 when at the age of twenty-two in this University he was wrestling with the profound questions of life. "How could I venture thoughts into the world before I knew they would be of use to the world? And how could I know that till I had try'd how they suited other men's ideas?" He wanted to know what other men thought, not what he should think; he had discovered that with infinite labour. The object of this essay is the same.

We are fighting to-day a war of ideas just as really as such wars have always been fought. Whether this is the way to decide on thought does not arise in this essay.

The war, then, is a struggle to find out what we think. Not what we think about Dictatorship, Democracy and Communism, but what we think about everything—what we think about man and God and matter and nature and evolution and time and the senses and reason and will. Looked at like this the war becomes a mental stock-taking of the first importance.

What, then, is the philosophy that has driven us to war? The roots of it seem to be in William Godwin—that is in ourselves. This brings home to us the fact that the war is the outcome of no national philosophy but of a philosophy that takes no count of frontiers but is within the citadel of the opposing power itself.

It is always difficult to discover origins. It is possible to go behind Godwin, just as it is possible to go behind Marx or Darwin or Nietzsche or any other significant

name, but it is unnecessary. Godwin said the new thing for his day; and what he said was that man was perfectible. "There is no science that is not capable of additions; there is no art that may not be carried to a still higher perfection. If this be true of all other sciences, why not of morals?" he wrote. There was no original evil in man, his character was made by environment only; as this improved man would improve. The standard of his improvement was his sense of justice, the means the spread of truth. So much carried away was he by his idea that he added an Appendix of "probable conjecture" to his work, *Political Justice*. There he put forward the achievement of immortality by man, when his mind should control the matter of his body. Propagation would cease. "The whole will be a people of men and not of children," he wrote. "Generation will not succeed generation nor truth have in a certain degree to recommence her career every thirty years . . . There will be no war, no crimes, no administration of justice, as it is called, and no government. Besides this there will be neither disease, anguish, melancholy nor resentment. Every man will seek with ineffable ardour the good of all. Mind will be active and eager yet never disappointed. Men will see the progressive advancement of virtue and good, and see that if things occasionally happen contrary to their hopes the miscarriage itself was a necessary part of that progress. They will know that they are members of the chain and that each has his several utility . . . They will never want motives for exertion, for that benefit which a man thoroughly understands and earnestly loves he cannot refrain from endeavouring to promote."

The implications of the doctrine were clear. Shelley found in them confirmation of his atheism. If man was perfectible by his own efforts he had no need of a God: the God was Man himself. Thus was enunciated the

religion of Man with which we are at grips to-day. The nobility of the conception should not be missed. If it had not been noble it could not have created the high excitement of a Shelley or a Whitman, or the enthusiasm, rising to poetry, of men like Proudhon and Dostoyevsky. Tragedy arises from a conflict of goods, as Hegel said, and never has that truth been better exemplified than to-day, when the good of Christianity is faced by the good of atheism.

The working out of the doctrine was manifold. The acceptance of Matter as man's environment was the work of Marx. He shed in turn metaphysics, jurisprudence and philosophy, and came down to the material world as the sole cause of man's history. From this flows the over-estimation of economics which is such a mark of our day.

Man, then, in a material world, but surrounded by other living beings from whom he thought himself apart. What reason had he to think this? The provocation of this thought resulted in the Evolutionist theories of Charles Darwin. He arrived at the possibility of "some one primordial form," the work of the Creator who then left the world to "secondary laws." Through these all life evolved. "We may feel certain," he says, "that the ordinary succession by generation has never once been broken and that no cataclysm has desolated the whole world. Hence we may look with some confidence to a secure future of great length. And as natural selection works solely by and for the good of each being, all corporeal and mental endowments will tend to progress towards perfection." No Flood and no Fall, no End of the World and no Judgment; no need of a Redeemer, certainly not of a Comforter, and only of a Creator to make the *algae*. Need he be there at all?

Darwin must have seen the implications of his theory, though he was very careful in the *Origin of Species* not

to get on to man. Samuel Butler had no such hesitation: "The divisions between varieties, species, genus all gone"; he wrote "between instinct and reason gone; between animals and plants gone; between man and the lower animals gone; so, ere long, the division between organic and inorganic will go, and will take with it the division between mind and matter." The *Origin of Species* was hardly written before the conclusions were drawn. Darwin had hinted at the effect of his theory on psychology. He had been pleased that Herbert Spencer had already seen the "necessary acquirement of each mental power and capacity by gradation." Butler's prophecy we have seen fulfilled to-day, for instance, in the "neutral monism" of Bertrand Russell and in the whole field of modern psychology. When the worship of God is admitted into the psychological system by derivation from something purely animal the wheel has come full circle.

The problem of the retention of God with the new ideas troubled many. Darwin saw no difficulty in it. "It has been said that I speak of natural selection as an active power or Deity," he wrote; "with a little familiarity such superficial objections will be forgotten." And in another place: "I see no reason why the views given in this volume should shock the religious feelings of anyone."

Religious feelings had been under continuous shock since the Age of Reason. Kant had attempted their defence under the stimulus of Hume's agnosticism by showing the ground in Reason for Belief. Hume held that experience was the sole source of knowledge. Kant set himself to show that even the experience is given by the understanding, and the whole imposing structure of his *Critique* is devoted to this one contention, that "we give ourselves the object," not in any subjective sense, but as something unknown, outside ourselves, which is matter in Kant's sense, permanence, and guarantees to us our existence in time. It was to the supreme difficulty of this

proposition that he addressed himself. On it he built the whole structure of his thought. All "objects," including the "object" of theology, are given by the intellect. Truth means that something rests on the "object." Thus pure reason gives the idea of a necessary First Cause, and, what to him was the better support, practical reason gives the moral law which needs the postulate of the Supreme Good. Stripped of inessentials it comes to this—that we give ourselves God, and if there is any proof of God morality proves him. So God is made dependent on morality, and Kant admits that if a man cannot accept this there is nothing but scepticism. "The argument of our Critique," he concludes, "must have . . . convinced the reader that although metaphysics cannot be the foundation of religion it must always continue to be a bulwark of it, and that human reason . . . can never dispense with such a science which curbs it and . . . prevents the devastations of which a lawless speculative reason would . . . be guilty in the field of morals as well as in that of religion." In this way—on lease from reason—Kant thought God might be retained.

The meaning of morality is a great difficulty. Looked at as a bulwark of religion it has come to supplant religion. A man may not be "religious," but if he is "moral" that will do as well. While God was allowed to be in nature the connection between religion and morality was real; once God was expelled there was none. Butler boldly proclaimed this truth: "The question whether such and such a course of conduct does or does not do physical harm is the safest test by which to try the question whether it is moral or no. If it does no harm to the body we ought to be very chary of calling it immoral, while if it tends towards physical excellence there should be no hesitation in calling it moral." Morality, then, becomes the law of the being, no more; and it is possible to be completely moral and utterly profane—as Esau. The

great service to religion in the separation of the two is not yet understood. Butler had no desire to serve religion, but truth serves it always and in any hand.

Man, then, perfectible in himself, living in a material universe which is self-acting, of the same stuff as he and to which he may give a God, works out his own salvation by following the laws of his being. With the Godhead of Man, then, comes the supremacy of his physical nature, and it is by no accident that our poets, philosophers, novelists, and writers of all sorts are so much concerned with sex and the senses to-day—rightly so if Man is God. Whitman sang the deification of man and man's sexual nature. Proudhon derived man's sense of justice from the duality of sex. Proust and Lawrence understood the evocations of a word. The derivation of mind from matter became the preoccupation of the intellectual. "What I want to do now," wrote Butler in 1885, "is to connect vibrations not only with memory, but with the physical constitution of that body in which the memory resides . . . I would make not only the mind but the body of the organism to depend on the characteristics of the vibrations going on within it." Modern psychology works along the same lines: the instincts lie waiting for excitation; this is initiated by the senses, and "in the absence of instincts no thought and no action." Modern philosophy goes further; perception becomes reaction to environment; volition, that when we have learnt this we have the power of making it tend to recur; the association of ideas becomes the association of bodily processes; imagination is associated with sense stimulus, and so on. It is with such a philosophy behind him that Spender rejoices in his "valued sex," that Huxley displays his "treasures of sensuality," and that the defeatist Auden invites us "to learn to leave ourselves alone."

But it is when religion is similarly derived that the thing becomes serious for the Christian. Yet if it is to

be retained it must be so derived. A popular psychologist, McDougall, puts the position: "if we accept the doctrine of the evolution of man from animal forms we are compelled to seek the origin of religious emotions and impulses in instincts that are not specifically religious." Clearly this is so; and this psychologist finds them in fear, "the tender emotion," and curiosity. The last "soared gloriously," he says, "until now the conception of natural causation predominates in every field." Serious as this is it is not so serious as the suggestion contained in the following extract. The writer is speaking of the influence of *The Golden Bough* and Jessie Weston's *Ritual to Romance* on the development of T. S. Eliot (Matthiessen, *Achievement of T. S. Eliot*): "What he learned . . . was the recurring pattern of similarity in various myths . . . the vegetation myths of the rebirth of the year, the fertility myths of the rebirth of the potency of man, the Christian story of the Resurrection and the Grail legend of purification. The common source of all these myths lay in the fundamental rhythm of nature—that of the death and rebirth of the year; and their varying symbolism was an effort to explain the origin of life. Such knowledge along with the researches of psychology pointed to the close union in all these myths of the physical and spiritual, to the fact that their symbolism was basically sexual . . . pointed in brief to the fundamental relation between the well-springs of sex and religion."

In a passage on Dante Eliot says: "The contemplation of the horrid or sordid or disgusting, by an artist, is the necessary and negative aspect of the impulse toward the pursuit of beauty. But not all succeed as did Dante in expressing the complete scale from negative to positive. The negative is the more important.

"The structure of emotions, for which the allegory is the necessary scaffold, is complete from the most sensuous to the most intellectual and the most spiritual." "The

contemplation of the horrid or sordid or disgusting" as "necessary" lies also behind his evaluation of Baudelaire. It is the necessity of reconciling the flesh and the spirit. Eliot is not alone in feeling it, although most modern poets of his school ascribe to him the leadership. Yeats sought it in what he calls the "peace of Heaven with Hell." This place of "rosy peace" is his "Secret Rose," "far off, most secret and inviolate." It is the place

> ". . . where those
> Who sought thee in the Holy Sepulchre
> Or in the wine-vat dwell."

The possibility of such a reconciliation, and indeed the manner of it, are made clear. Woman attains a new significance. She "cannot escape . . . the primal thrust to which she is appointed, of the patient dust . . . clamouring for that which must be the whole meaning of dust, because it is not dust," says Humbert Wolfe. The "Respectable Woman," who has striven against the lust of the flesh, is made to ask:

> "Is there no virtue in bearing down the thrust
> Of the jungle moving faintly in the blood
> And the smooth velvet footsteps and the wet
> Muzzles of creatures, stirring in the mud and the hot breath
> That men call freedom to live and I called death?"

And the answer is that there is none, for she is said to have "sacrificed for that bleak satisfaction even Christ." The same seething life seems to James Joyce the starting-point of consciousness. In *Finnegan's Wake* he says with quite unJoycean clarity: "A plainplanned liffeyism assemblements Eblania's conglomerate horde." That is why he is for what he calls "liberty of perusiveness"—at least it is "whyafter what forewhere." "Liffeyism" is a good word for the thing indicated to any Dubliner, though he may not agree with the judgment. Believing in the stream of consciousness, Joyce's plea is for unrestraint, and his slobbering style suits his matter well. He

is perhaps the ablest exponent to-day of the "necessary" negative of Eliot.

But although Eliot says "the negative is the more important," he strives by his "Stair" to reach the positive as he says Dante reached it. Woman, therefore, is also sin, and must be passed on the "stair" up which Virtue leads from Lust.

> "Blown hair is sweet, brown hair over the mouth blown,
> Lilac and brown hair;
> Lord, I am not worthy,
> Lord, I am not worthy,
> But speak the word only."

But though Virtue struggles upward, Lust is retained, and, put plainly, becomes the starting-point of God. From such a view flows the "sinfulness" of sense and the "merit" of asceticism. It is the struggle to retain Evolution and Christianity or Matter and God. The means found is the deification of woman: she herself sanctifies her nature. There is no other way of reconciliation, but the solution by this means is absolute. We find it in the Ashtaroth, Eve, Psyche, Mary, of Humbert Wolfe, or in such a poem as Yeats's *The Lover speaks to the Hearers of his Song in Coming Days*:

> "O woman kneeling by your altar-rails long hence
> When songs I wove for my beloved hide the prayer,
> And smoke from this dead heart drifts through the violet air
> And covers away the smoke of myrrh and frankincense,
> Bend down and pray for all that sin I wove in song
> Till the Attorney for Lost Souls cry her sweet cry
> And call to my beloved and me, 'No longer fly
> Amid the hovering, piteous, penitential throng.' "

In a review of the symbolism of Yeats's later work a critic says: "In *Leda and the Swan* we find Yeats going back two thousand years to the miracle which ushered in classical civilisation. The Dove of the Annunciation becomes the Swan . . ." (J. P. O'Donnell, *Sailing to Byzantium*). Commenting on this a reviewer in *The Irish*

Times writes: "There is no suggestion in the Gospels of any 'Dove of the Annunciation.' All four Evangelists use the image of the Dove in a perfectly different connection—that of our Lord's baptism. The beautiful austerity of the metaphor is the best refutation of an almost blasphemous comparison." But there is such a suggestion in Yeats's poem, *The Mother of God*:

> "The threefold terror of love, a fallen flare,
> Through the hollow of an ear;
> Wings beating about the room;
> The terror of all terrors that I bore
> The Heavens in my womb."

And so the matter is taken a stage further.

But there is a second side to the reconciliation between God and matter. In the *Golden Bough*, Sir James Frazer shows that the prime pagan god was the god of productivity—in the corn, the tree, the vine and man. "Dionysus . . . was essentially a god of vegetation." The pagan believed that he could effect his purpose, fertility, because "the idea of the world as a system of impersonal forces acting in accordance with fixed and invariable laws has not yet fully dawned or darkened upon him." He could, therefore, influence the god, by the magic of imitation or contact. To the first belonged many rites still to be seen, to the second the sacramental killing and eating of the god. "By eating the body of the god he shares in the god's attributes and powers. And when the god is a corn-god, the corn is his proper body: when he is a wine-god, the juice of the grape is his blood; and so by eating the bread and drinking the wine the worshipper partakes the real body and blood of his god." It is impossible not to see the connection of this with the Christian sacrament of Holy Communion.

The doctrine of transubstantiation allows a connection with it in a special way; for by transubstantiation man actually partakes of the god in his own element, thus

sharing in his attributes and powers. Frazer concludes his work: "The result of our inquiry is to make it probable that down to the time of the Roman Empire and the beginning of our era the primitive worship of the Aryans was maintained nearly in its original form in the sacred grove at Nemi . . . But Nemi's woods are still green, and at evening you may hear the church bells of Albano and perhaps if the air be still of Rome itself ringing the Angelus . . . *Le roi est mort, vive le roi*!" This might refer to Christianity generally, but in the last edition "*Ave Maria*!" is added twice, thus indicating that the Roman form is intended. It is indisputable that the book influenced Eliot, and supplied something that he was looking for.

And so the reconciliation would seem to be complete: matter deified and God made into matter. But from the reconciliation emerges Man, not God. It is as Swinburne sang: "Glory to Man in the Highest, for Man is the master of things."

From this we turn to the frank atheism of the man who more than any other is responsible for this war—Nietzsche. It was Dionysus *versus* Christ to Nietzsche, and having made his statement he was untroubled by impossible reconciliations. The tremendous claim he made was for complete Freedom of the Will. The significance of the claim cannot be seen without Atheism. With Christ gone Christian values go—there are no longer right and wrong, good and evil in a Christian sense. New values have to be made, and the Will makes them. "We dare to live in a world purged of morality, we pagans in faith," he says. Faith in the Will to value must be created. Men must believe that everything in the world is the creation of the human will and have a clean conscience in exercising it. The new values will be made by the higher men, who will say, this is good, this is bad; this is right, this is wrong; this is ugly, this is beautiful.

"I am writing for a race of men which does not yet exist," wrote Nietzsche in 1889, "Live dangerously!" But they now exist, and, among other things, they say Force is Right. But the most complete exposition of the ethics of violence was made not by a German but by a Frenchman, Georges Sorel. He concludes his *Réflexions sur la Violence* with these words: "Dans la ruine totale des institutions et des mœurs il reste quelque chose de puissant, de neuf et d'intact, c'est ce qui constitue, à proprement parler, l'âme du prolétariat révolutionnaire . . . C'est à la violence que le socialisme doit les hautes valeurs morales par lesquelles il apporte le salut au monde moderne." Here are the new values in Socialism too, and this—the right to make them—is the reality of the claim of Freedom of the Will. Therefore is the will free?

It is here, in the realm of the Will, that the link between German and Russian philosophy arises. Lenin very properly said that Communism was impossible without atheism, and that atheism was incomplete without Communism. The Communists derive from Godwin, Proudhon, Marx, etc., and are perfectly logical in their atheism and their materialism. Matter they conceive as being capable of "physical, chemical, biological, conscious and social action." At no point will Evolution fit Chistianity; it fits atheism perfectly.

Having then accepted atheism, how is advance to be made? The Russian answer is the same as the German—by the revolutionary changing Will. This, according to Berdyaev, supplies the mystic element so necessary to the Russian. There is nothing strange in the junction of the Russian and German philosophies; their lines of development are the same, except that in Russia emphasis has been laid on asceticism because there is a purer yearning over man. It was, according to the same authority, the dedication of man to men that drew Marx to the Russians and that inspired Dostoyevsky's *The Possessed,* said by

Lenin to be the gospel of the Communist revolution. This book was recognised by Masaryk as being symptomatic of the creed opposed to Christianity. There we see the complete dedication of man to the purpose of changing the world, or revolution. It is the dedication of body, soul and spirit to the Will. Other Russians have gone further, ascribing to the Will the power to overturn the laws of nature, even death. It was the power of man to achieve his own immortality that was the summit of Godwin's philosophy, and this is the excitement arrived at by the Communists to-day: a plastic world and a titanic changing Will.

And so the edifice of atheism seems to be complete. It is the work of no one race or state. The contributions of Englishmen are as notable as those of Germans, of Frenchmen as of Russians. The main difference seems to be that atheism has become the political philosophy of the Dictatorships while the Democracies are still nominally Christian.

But without a clear understanding of the stakes involved how long will they remain so? It was in the slow and painful realisation of what was abroad that the infinite service to the world of George Berkeley's work came home to me. I am aware how the superficiality of this essay must jar on the specialist; I am aware particularly how academic philosophy has become: one has only to read the mathematical tables prefixed to Journals of Philosophy as Contents to realise this. But I cannot forget that Berkeley always considered and spoke of his philosophy as "useful," that he grounded himself on the "common" sense, and that he warned man "not to expect to find truth . . . anywhere but in his own mind." He would not allow any exclusiveness of intellect—that was where he was so great. The hardest thing that any man would have to answer was known to the simplest. This is not far off Meno's boy, and probably explains why Berkeley reposed

on Plato at the end. It was because I had discovered the supreme usefulness to me of Berkeley's work that this analysis was undertaken.

I was attracted to Berkeley first by the goodness of his life; secondly, by a sense of shame at knowing nothing of the work of our greatest son; thirdly, by a remark of one of the ablest students I have had—that the philosophy of Berkeley seemed to him "arrant rubbish." The stimulus thus provided led to a reading of Berkeley's works, and the reading to a slow comprehension of the immensity of what he did. This was to provide an answer to every one of the questions with which we have been dealing—before they were asked.

Berkeley was a Bishop of the Church of Ireland, and held the faith of that Church in complete orthodoxy. His Christian faith was the root and touchstone of all his thought; he is the Christian philosopher *par excellence.* His life, religion and philosophy are of a piece: Dr. Luce had only to place his works in order to provide a complete answer to the absurd charge of recantation or anarchy in his thought. Early in his life he published his *Principles of Philosophy.* His other works—for instance, the *Theory of Vision* and *Concerning Motion*—dealt with various aspects of the doctrine, the *Dialogues* and *Alciphron* drove it home, and *Siris* linked it with belief in God. But great as these works are they cannot touch in power the immense concentration of thought of the *Commonplace Book.* If ever a book was alive with the excitement of invention—in the true sense, discovery—this book is so. It leaps in the hand with the nervous intensity of thought within it. Here are the convictions that divided him from other men: "If . . . I differ from a philosopher I profess to admire 'tis for that very thing on account whereof I admire him, namely the love of truth"; here is the language of certainty: "I say . . . You ask me . . . According to my doctrine"; and the amazement of discovery: "I

wonder not at my sagacity in discovering the obvious tho' amazing truth. I rather wonder at my stupid inadvertency in not finding it out before."

In showing the usefulness of Berkeley's work it will perhaps be well to take the points in the order in which they have been raised. First, then, as to Berkeley's faith. He began, continued and ended with belief in God. "I am the farthest from scepticism of any man," he said; and again, that he did not want any man "to sit down in a forlorn scepticism." It was because his doctrine ended doubts that he was "willing to be understood by all." He urged men to look into their own minds and see if the things he said were not true: "I pretend not to prove . . . Let them stand or fall by their own evidence." The doctrine was, of course, immaterialism: "all the choir of heaven and furniture of the earth, in a word all those bodies which compose the mighty frame of the world have not any subsistence without a mind." To be was to be perceived. But it was also to exist in complete reality because within the mind of God, "the eternal, invisible Mind which produces and sustains all things." The mind of man could perceive the universe because it was within the mind of God, with which he had communion. Immaterialism was "seeing all things in God." In *Siris* he moves from the immanence to the transcendency of God: "God remains forever One and the same. Therefore God alone exists . . . Our minds participate so far of existence as they do of unity. But it would seem that Personality is the indivisible centre of the soul or mind; which is monad so far forth as she is a person. Therefore Person is really that which exists; inasmuch as it participates the Divine Unity." He had "much meditated upon God" and all he thought was thought in him.

In Berkeley the materialism of Marx encounters its direct negative, and nothing less will do. Berkeley was not alone in his progress along the road to immaterialism,

but he was alone in his bold proclamation of it and in seeing its implications and necessity. The complete reality of what he had to say was welcomed by perceiving minds. Coleridge, who could see the gigantic power of conscience, welcomed it. Fielding, the justness of whose judgment pierces to the heart, recognised the truth in Berkeley. He comforted Swift, and if there is any reality in calling the Spirit of truth the Comforter we may believe that this was why. He was possibly the link between Swift and Vanessa. (In his turn he so brought home the greatness of Swift to the Senior Sophisters he lectured here that they gave us the bust of Swift in our Library.) Blake understood him, and Queen Caroline, one of the greatest women of her day. These were men and women with their feet firmly planted on the earth, but they were ready for what Berkeley had to say. Whatever else may be charged against him there is no unreality in his immaterialism.

When we approach Evolution the matter is the same. Berkeley makes his bold pronouncement: "No sharing betwixt God and nature or second causes in my Doctrine." He recognised that if he had found "the obvious though amazing truth" it would fit all conditions, and he knew that the highest bar to which his doctrine could be brought was the human mind under inspiration. Therefore he brought his theory to the bar of Scripture. "There is nothing in Scripture that can be wrested to make against me but perhaps many things for me"; and again, "my doctrine excellently corresponds wth the Creation. I suppose no matter, no stars, sun, etc., to have existed before." Thousands of millions of years, the immensities of the universe and the infinity of minuteness—in fact all infinity staggers the intellect as the idea of eternity, "for ever and ever and ever," does. Berkeley ends all this amazement: there is not infinite division, there is a minimum perceptible, there was a moment of creation, when the things in the mind of God became perceptible to man; the

desire to know assures the power of knowing. And so the awfulness is gone. But even sceptical inquiry is leading back to God (it seems as if the Spirit of truth will do failing revelation). The fact that the atom can be split and that from *amœbae* life emerged proves only that the human mind is free to probe, not that it can plomb the mind of God. And probing, it finds infinity, which is an attribute of God. The pain of "the dividing betwixt God and nature" is in Berkeley's words: "as if nature were anything but the ordinance of the free will of God."

Darwin rightly saw that it was the claim of activity for Natural Selection that challenged God. "It has been said that I speak of natural selection as an active power or Deity . . . With a little familiarity such superficial objections will be forgotten." But the objection is not superficial, it is the whole point. Can there be activity without God? If there can then God is gone. Berkeley perfectly understood this. The active principle is mind—the mind of man in the mind of God, "motion itself being in truth a passion." "We are sprung from the Father, irradiated . . . by the Son and moved by the Spirit," he wrote. Motion is the result of activity, of life, of mind, and does not inhere in mass either as gravity or impulsion or anything else: these are effects, not causes. Physics and mechanics are permissible if properly understood, as they are by the great mathematicians. "Certainly as far as regards attraction it is clear that it is adopted by Newton not as a real physical quality but merely as a mathematical hypothesis . . . it will be of great avail . . . to distinguish between mathematical hypotheses and the nature of things." The mistake lies in confounding mathematics with metaphysics, which concerns itself with causes. About how motion begins he is equally clear: "It is neither acid nor salt nor sulphur nor air nor aether nor visible corporeal fire, much less the phantom Fate or Necessity, that is the real agent, but by a certain analysis, a regular connexion

and climax we ascend through all those mediums to a glimpse of the First Mover . . . hence that perpetual struggle to recover the lost region of light, that ardent thirst and endeavour after truth and intellectual ideas, which she (the soul) would neither seek to attain nor rejoice in nor know when attained unless she had some prenotion of them . . . So that learning seemeth in effect reminiscence." A stirring in the mind, a heating of the blood and generation.

In Darwin's theory it is the environment that is the agent by which activity is got going. It is because the environment, in a broad sense, has to be overcome that the struggle for life begins. Then those fittest for the environment survive. He speaks of "one general law leading to the advancement of all organic beings—namely, multiply, vary, let the strongest live and the weakest die." If this is the law then certainly God is not in nature. But this is not the law of man's advancement, even physically. The will to live triumphs over the weakest frame, physical health depends on mental health, and immorality, in Butler's sense, offending against the laws of the being, is death. But there is more than this against the doctrine. It is environment acting in time. Darwin is very careful to deny this. ". . . it has been erroneously asserted that the element of time has been assumed by me to play an all-important part in modifying species." But when one reads: "the early differences would be very slight but in the course of time . . ."; "after a thousand generations"; "By continuing the process for a greater number of generations we get eight species . . . Thus I believe species are multiplied and genera formed," one must think there was no error. In dealing with the geological record his assumptions are astounding, and two are in regard to time. He must assume "long periods" before the Cambrian, that nature "swarmed with living creatures," although there is no record of them, and that the earth

"has lasted long enough" for his conclusions. Evolution hangs on time, and if time goes for the philosopher and physicist it cannot remain for the natural scientist. All must ultimately fit in together: there must be time for all or no time for all. The retention of time alone would seem to be fatal to Evolution.

Berkeley had abandoned time: Time is the "train of ideas . . . Time a sensation; therefore onely in y^{e} mind." Kant retained matter, in his sense, permanence, for the sake of time: "the determination of my existence in time is possible only through the existence of actual things which I perceive outside me." This consciousness is bound up with the consciousness that I make the time determination. "In other words," he says, "the consciousness of my existence is at the same time an immediate consciousness of the existence of other things outside me"; which only means that you put your body in time and space or clothe your ego. You give yourself a permanent (matter) because you cannot have a time determination (inner sense) without it. Thus the thing (matter) in outer sense (space) is immediate—not even mediate; matter is essential. So we give ourselves matter because we cannot have a time determination without it. But if time goes we do not need matter, even on Kant's showing. Berkeley was never in this difficulty. He said that time was a passion. The necessity we feel to place ourselves in time and space is, I suppose, the passion of identity. It is a nice commentary on time that the best answer to Evolution should have appeared before it; but for the weakness of our mortal nature the answer was repeated in what we take to be the natural order. Berkeley's *Commonplace Book* was written in 1705–6. It was not published, but the various books worked up from it were, throughout his life. He died in 1753. In 1859 *The Origin of Species* appeared, in 1867 *Das Kapital*, and in 1871, for the first time, *The Commonplace Book*.

The limitation of Kant's perceptions is nowhere more clearly seen than in his thought on God. Plato he dismissed, Berkeley he did not understand, and it was apparently only "the danger of materialism" that necessitated a doctrine of the soul. He found materialism so formidable that he went on to its own ground to fight it: he sought a doctrine of the soul founded on principles of reason. All that we are given is perception and the change to new perceptions. This is almost the *esse percipi* of Berkeley, but Kant clings to his "reality." The placing of the object in time and space makes it "real," it itself remains always unknown, but we give ourselves a transcendental object. There are two sources of causality, Nature and Freedom. In Nature every cause has a cause, and this operates all through the field of appearances. But there is a causality arising from the imperative "ought": this "does" happen, this "ought" to happen. This causality is Freedom. Thus there is an ideal, the virtuous man, to which we conform ourselves. He is a concept of reality, and the sum of this reality is all-wise, almighty, etc., in a word, is God; but as an "object" is as much unknown to us as any other. The reason we get the "object" God is just the same as the reason for any other object (only in this case it is the sum of all), and that is that we could not have any experience without. So, on this count, Freedom, we give ourselves God. On the head of Nature we arrive there too. The ancients had regarded matter as the substratum of appearance. Every determination of matter then (e.g., impenetrability) is an effect which has a cause, and hence is derivative or conditionally necessary, and so may be removed. In this way the whole existence of matter may be removed, and, therefore, there is no necessary original being. In other words, you cannot have a first cause if you have a material world. This was very serious for Kant. He thought that if the ancients had regarded matter *in itself*, in his way, as permanence,

they could have kept both a permanent world and a first cause. But the first cause is only "a regulative principle for reason," and gets into much the position of time and space: it is a unifier—that is all; for he says we must be "free to derive the appearances of the world and their existence from other appearances with unfailing confidence, just as if there were no necessary being." We are to keep God and Evolution. And so the idea of a Supreme Being becomes a regulative principle for reason but not a causative principle of Nature. Kant realised the "apparent" contradiction, but he could do nothing with it, for all proofs go back to an ontological (what may be), which shows the necessity of a first principle, but not the "existence" of it or the "reality" of God. God is "the object in the idea" (object I give myself) to systematise everything; everything then is "as if" there were a supreme intelligence. Reason gives the idea of God: no more. And so we arrive at "a belief adequate to quiet our doubts, though not to command unconditioned submission," which is no belief in God. The greatest comfort we can have is that, although we shall never prove that there is a God and a future life, no one can disprove it; and the only reason why we should not find a "dwelling-place" in scepticism is because we have no more knowledge that there is not than that there is, which surely is the place where the forces are equal and opposite and we have come to rest. Was it any wonder that Berkeley called such a sitting down "forlorn"?

To all this Berkeley opposes the Christian faith with its sure knowledge founded on the inter-communication of our mind with the mind of God; "we have the mind of Christ"; "in him we live and move and have our being."

The certainty of truth led Berkeley through the intricacies of sense with equal sureness. Butler would have been surprised to find the Christian philosopher Berkeley standing shoulder to shoulder with him in what

was looked upon as his atheistical view of morality. Morality to Butler was following the law of the being and the end physical health. It was the same to Berkeley. "Sensual Pleasure is the *summum bonum.* This the great principle of Morality. This once rightly understood all the Doctrines, even the severest of the Gospels, may cleerly be Demonstrated . . . Sensual pleasure *quâ* pleasure is good and desirable by a wise man. But if it be contemptible 'tis not *quâ* pleasure but *quâ* pain or cause of pain or (w^{ch} is the same thing) of loss of greater pleasure." The being its own highest law, achieving excellence by following this law, morality without religion—so far Butler and Berkeley go together. But Butler the Evolutionist, "dividing betwixt God and Nature," made man a law unto himself, while Berkeley "seeing all things in God" found no such anarchy. "No sharing betwixt God and Nature or second causes in my doctrine," he wrote. God was the author of nature and, therefore, the implanter of the moral law. Sensual pleasure was the highest good of the organism and, therefore, the great principle of morality. The *summum bonum* was not sensual indulgence, but a strict weighing up of pleasure and loss of pleasure to attain the greatest sum. This if attained was moral excellence and the highest that morality could go. Even the severest moral doctrines could be shown to be those which would yield the highest sensual pleasure to the being. Morality understood as the law of the organism and the organism understood as the creation of God, there was no conflict between morality and religion. Berkeley had "much meditated upon God, the human mind and the *summum bonum,*" and these were his conclusions.

Berkeley was aware of the implications of his doctrine as far as Roman Catholic dogma was concerned. Father Malebranche, the Roman Catholic priest, had arrived at almost the same point as Berkeley, but rejected immaterialism, because, he said, "we cannot deny the existence

of bodies, through a principle of religion" (quoted Luce, *Berkeley and Malebranche*). There was no such bar to Berkeley. The "finiteness of our mind—making it possible for contradictions to appear true to us" was merely an "excuse" to him. "The loss of the excuse may hurt transubstantiation," he wrote, "but not the Trinity." His was far too great a mind to accept chaos in the foundations and expect a sound theology and a just view of life to follow. Not for him was the "Dove of the Annunciation" or the "fundamental relation between the well-springs of sex and religion," rather was there a bold prophecy of what would follow from an abandonment of truth: "Matter once allow'd," he wrote, "I defy any man to prove that God is not Matter."

There remains the claim of freedom of the will. Berkeley had faced the question, looking in his own mind to discover truth, as he warned every man to do: "I desire and warn him not to expect to find truth in my book or anywhere but in his own mind." He starts with his usual boldness: "Man is free. There is no difficulty in this proposition if we but settle the signification of the word *free*." But there was immense difficulty in this, in understanding the reconciliation of the free will of man with the will of God. In no proposition can we see more clearly the process of his labouring mind. The argument is carried on almost in our presence:

"Strange impotence of men. Man without God wretcheder than a stone or tree; he having onely the power to be miserable by his unperformed wills, these having no power at all."

"In moral matters men think ('tis true) that they are free; but this freedom is only the freedom of doing as they please; w^{ch} freedom is consecutive to the Will, respecting only the operative faculties."

"Men impute their actions to themselves because they will'd them and that not out of ignorance, but whereas

they knew the consequences of them whether good or bad."

"This does not prove men to be indifferent in respect of desiring."

"If anything is meant by the *potentia* of A.B, it must be desire; but I appeal to any man if his desire be indifferent, or (to speak more to the purpose) whether he himself be indifferent in respect of w^t he desires till after he has desired it; for as for desire itself or the faculty of desiring that is indifferent as all other faculties are."

Then comes the exuberant conclusion: "Actions leading to heaven are in my power if I will them; therefore I will will them."

Will, the faculty, indifferent—"as for desire itself or the faculty of desiring that is indifferent as all other faculties are"; Man a free agent—"but this freedom is only the freedom of doing as they please . . . respecting only the operative faculties"; dependent for his motive power upon the will of God—"strange impotence of man. Man without God wretcheder than a stone or tree; he having only the power to be miserable by his unperformed wills, these having no power at all"; lastly, a distinction between will and desire and a setting of them in order. The power to choose what you will desire (or indifference) is not in the mind before desire, but follows it—"I appeal to any man . . . whether he himself be indifferent in respect of what he desires till after he has desired it." These seem to be the conclusions of Berkeley's analysis. The last is the most important. The desire is there before the will is exercised about it. This fits with St. Paul's "the good that I would I do not: but the evil which I would not, that I do." The conflicting desires are the field for the exercise of the human will, the desires themselves are the field of the will of God, existing with this extreme reality in the world. It follows, then, that men know the will of God. They *know* the difference between good and evil: they do not make it. Their values, therefore, are

already made and are not within the province of the will. It is for this reason that there is such concord among men about what is good and true and beautiful. Men may by their will act on other values, but even here their motive power depends upon the will of God. There are, therefore, no such powers for the will as are claimed for it by Germany and Russia.

In *Siris* Berkeley says: "Prevailing studies are of no small consequence to a state, the religion, manners and civil government of a country ever taking some bias from its philosophy, which affects not only the minds of its professors and students but also the opinions of all the better sort, and the practice of the whole people remotely and consequentially indeed, though not inconsiderably."

It is because I find myself in profound disagreement with the thought of my own day and have found Berkeley of supreme usefulness to me that I adventure these thoughts in his University and mine. "This is my end and not to be inform'd as to my own particular."

OLIVE ARMSTRONG.

CAN WE PROVE THAT THERE IS AN EXTERNAL WORLD?

THERE can be few sciences that have altogether escaped the punishment of Tantalus. For centuries geometers laboured to prove the fifth postulate of Euclid; psychologists searched for the seat of the soul; alchemists sought for the elixir of life. Philosophers have been tantalized perhaps more than any. More expense of thought with less return of permanent achievement could scarcely be found in any other science; and to-day many problems still await a final solution. No doubt some progress has been made, for it has been shown fairly conclusively that some hoary problems are inherently insoluble; and this is the next best thing to solving them.

Among these insoluble problems, many philosophers would have included the task of proving the existence of an external world. (What is meant by an external world will be explained below.) Descartes, it is true, speaks of "the grounds on which the existence of material things may be known with certainty"[1]; and Locke declares that "the notice we have by our senses of the existing of things without us, though it be not altogether so certain, as our intuitive knowledge . . .; yet it is an assurance that deserves the name of knowledge."[2] But Collier, on the other hand, claims "to demonstrate . . . that an external world is a being utterly impossible."[3] These are two extremes; many philosophers have been content to halt between the two opinions, holding with Hume that whereas

[1] *The Principles of Philosophy*, Part II, Prin. I.
[2] *An Essay concerning Human Understanding*, Book IV, Chap. XI, § 3.
[3] *Clavis Universalis*, Part II, Introduction.

we have a strong natural tendency to believe in the existence of an external world, there is no way of discovering whether this belief is true.

This latter attitude is probably the most popular to-day; so much so, that a "proof of an external world" is liable to be received with as much credulity as an attempt to square the circle. It is, therefore, not a little surprising to discover that Professor G. E. Moore, a philosopher justly renowned for his caution and insight, has claimed in a recent lecture before the British Academy to be able to supply the *desideratum*.[4] Yet, as Professor Laird has recently warned us, "refutations may become antiquated as well as proofs"; and it may well be that Professor Moore has accomplished the improbable. In this short essay I shall attempt to estimate the success of his venture.

Professor Moore begins his discussion with a passage in Kant's *Critique of Pure Reason*, which is as follows:— "It still remains a scandal to philosophy . . . that the existence of things outside of us . . . must be accepted merely on *faith*, and that, if anyone thinks good to doubt their existence, we are unable to counter his doubts by any satisfactory proof."[5] Kant then offers what he considers to be the only rigorous proof of the point in question. This proof Professor Moore does not pause to consider, merely remarking that he thinks it by no means certain that the proof is satisfactory. He proceeds instead to the task of discovering the exact meaning of the phrase "things external to us." There is no doubt that even if his "proof of an external world" should turn out to be unsatisfactory, his careful analysis of this phrase is a work of great importance.

Philosophers, he observes, have commonly treated as equivalent in meaning the expressions "external things,"

[4] *Proof of an External World*, Annual Philosophical Lecture, Henrietta Hertz Fund. Trust British Academy (1939).

[5] *The Critique of Pure Reason*, tr. Kemp Smith, B xxxix, note.

"things external to *us*," and "things external to *our minds*." Of these, the last is the least ambiguous, but is still not clear.

In order to clarify these conceptions he refers us to another passage in the *Critique*[6] where Kant has distinguished between objects "external in the transcendental sense" and "empirically external" objects; the latter Kant says he will call outright "things which are to be met with in space." He also speaks of them as objects "presented in space." It is, therefore, not unreasonable to suppose that Kant treated the three phrases "external things," "things to be met with in space," "things presented in space" as equivalent. Professor Moore argues that, although they are closely related, equivalence does *not* obtain between them. What the relations between them are, he now proceeds to consider.

The phrases "things presented in space" and "things to be met with in space" (or, as I shall sometimes call them, "things meetable in space") are the first to be examined. Professor Moore easily finds examples of things of which it might reasonably be said that they are "presented in space," but of which it could hardly be said that they are "to be met with in space." For example, after-images, double-images, most pains, are "presented in space" but are not "to be met with in space." The paper at which you are now looking is, however, according to Professor Moore, naturally said to be both "presented in space" and "to be met with in space"; and one reason for the difference, the difference we have just noted between this sheet of paper and an after-image of it, is as follows:—"When I say that the white four-pointed paper star . . . was 'to be met with in space,' I am implying that *any one*, who had been in the room at the time, and who had normal eyesight and a normal sense of touch, might have seen and felt it. But,

[6] *Op. cit.*, A 373.

in the case of those grey after-images which I saw, it is not conceivable that any one besides myself should have seen any one of them" (p. 9). (In other words, the paper is thought of as a potentially "public" object; whereas a thing which is merely "presented in space" is "private.")

It follows, according to Professor Moore, that not all things "presented in space" are things "to be met with in space." It is also true that in what he calls the natural usage of the latter phrase, not all things "to be met with in space" are "presented in space." The tram-ticket in my coat-pocket, for instance, is an object "to be met with in space," but at the moment it isn't being presented to anyone. (Many philosophers, of course, would deny that there *are* any objects "to be met with in space" in the sense Professor Moore has called the ***natural*** usage. They would say that the table you perceive is a collection of *your* sensa, all of which are private to you. This is a view ascribed to Berkeley, for example, by some philosophers.

Having explained how he considers two of the three phrases to be related, Professor Moore turns his searchlight on the expression "external things." This, he points out, has often been used by certain philosophers in contrast with the technical phrase "things in our minds." Pains and mental images are examples of the sort of "things" that these philosophers would say are "in my mind." And when they have contrasted this toothache which is "in my mind" with that star which is "external to my mind" they "have meant to emphasize some important difference which they feel to exist between these two things" (p. 19).

But *what* difference? One difference is that the star, according to Professor Moore, is "to be met with in space," whereas the toothache is not. But this, he holds, is not the *main* difference between them. The discovering of this difference is a typical example of Professor Moore's well-known method of close and patient analysis. The difference he finally discovers may be stated in the following

way:—If I had a headache at 8.0 this morning, then it follows that I was "having an experience" at that hour (he explains as clearly as need be what is meant by "having an experience"). If, however, I was more than five feet high, or had ten fingers at 8.0 this morning, it does *not* follow that I was having an experience at that hour. I might have been in a dreamless sleep. Thus, to say that a pain is "in my mind" means that "there would be a contradiction in supposing *that very same pain* . . . to have existed at a time at which I was having no experience" (p. 21); whereas to say that this star is "external to my mind" means that there is no contradiction in supposing this star to exist at a time when I am having no experience (p. 22).

Similarly, to say of this star that it is "external to *our* minds" means that there is in no case a contradiction in supposing it to exist at a time when no human being was having an experience (p. 22).

This, then, is what Professor Moore thinks that philosophers have meant by those "puzzling and misleading phrases" "in my mind" and "external to our minds." In order, therefore, to prove that there are things "external to our minds" he must show that there do exist things such that there is in no case a contradiction in supposing that they exist at a time when no human being was having an experience.

His proof of this is quite simple, and is best given, I think, in his own words. "Consider any kind of thing, such that anything of that kind, if there is anything of it, must be 'to be met with in space': e.g., consider the kind 'soap-bubble.' If I say of anything which I am perceiving, 'That is a soap-bubble,' I am, it seems to me, certainly implying that there would be no contradiction in asserting that it existed before I perceived it and that it will continue to exist, even if I cease to perceive it. This seems to me to be part of what is meant by saying that it is a real

soap-bubble, as distinguished, for instance, from an hallucination of a soap-bubble [p. 23] . . . That is to say, from the proposition with regard to anything which I am perceiving that it is a soap-bubble, there *follows* the proposition that it is external to *my* mind. But if, when I say that anything which I perceive is a soap-bubble, I am implying that it is external to *my* mind, I am, I think, certainly also implying that it is also external to all other minds: I am implying that it is not a thing of a sort such that things of that sort *can* only exist at a time when somebody is having an experience" (p. 24). All that is required, therefore, to complete the proof is to show that there do exist such things as soap-bubbles or stars or hands; and this Professor Moore proceeds to attempt to do. "I can prove now, for instance, that two human hands exist. How? By holding up my two hands, and saying, as I make a certain gesture with the right hand, 'Here is one hand,' and adding, as I make a certain gesture with the left, 'and here is another'" (p. 25).

This is the "proof of an external world," or rather, one "proof," since many others of the same type could be given. We must now consider whether it is satisfactory. Professor Moore himself notes immediately that "in spite of all that I have said, many philosophers will still feel that I have not given any satisfactory proof of the point in question" (p. 28). And he explains why they may possibly be dissatisfied. They will say that he has not proved the premiss of his argument, *viz.*, the proposition "Here is a hand," and they will contend that if he hasn't proved or can't prove it, then he can't *know* that "here is a hand"; he can at most *believe* it very strongly, so that, unless some other proof be forthcoming, the existence of external things remains at best a matter of *faith.*

To this type of objection Professor Moore makes a somewhat surprising reply. He does not profess, he

asserts, to be able to prove that "here is a hand"; in fact, he very much doubts whether it can be proved. But, although he may not be able to *prove* it, it does not follow that he cannot *know* it. Many philosophers, including Kant, have thought that it did follow, but they were, he holds, mistaken. "I can know things which I cannot prove" (p. 30); and he claims that, among things which he certainly did know, was the premiss of his proof. He does not give us any proof of this latter assertion, although he says it can be proved. I do not know whether *this* proof has ever been published, though I believe Professor Moore did communicate it in a paper read to a philosophical society a few years ago. This proof may be valid, but there are certain facts which seem to me to make the giving of such a proof very difficult. I shall now briefly consider these facts and shall then attempt to come to closer quarters with the "proof of an external world."

Professor Moore maintains that we can know such things as that "here is a hand." It is important to remember that he is here using the word "know" in what is often termed its "strict" sense; and he is quite aware of this, for he contrasts "knowledge" with "faith" (p. 30). In the strict sense, it would be self-contradictory to say "I know that I have sixpence in my pocket, but perhaps I haven't"; or "I know that I posted your letter, but possibly I didn't"; or "I know that this is a hand, but perhaps it isn't."

Therefore, if we are to know that "this is a hand" and are not to contradict ourselves, we must also, I think, know that the statement "perhaps it isn't a hand" is false. We must be able to repudiate warmly the suggestion that it is not a hand. But can we do this? Are we "dead-certain" that this is a hand? Of course, we would be immensely surprised if it were not, if, for instance, it should turn out that we had been subject to a hallucination. But surprise is not enough. I can well remember occasions

when in a dream I was quite certain that I was falling over a precipice; but, of course, there *was* no precipice, a fact I was no less surprised than relieved to discover.

If it should be asked what we *can* know then in this "strict" sense, a list could easily be given. I know, for instance, that, whether dreaming or not, I am having the experience of seeing colours, hearing sounds, feeling hunger, and suchlike; I know that I am thinking and wishing; I know certain logical and mathematical truths such as that two and three are five, and that the middle term of a syllogism must be at least once distributed. The list is not, perhaps, a very exciting one, but as Professor Price has said, "Although the circle of knowledge is small, a lot of knowing goes on inside it"; and the things we do know give us the evidence upon which our multitudinous beliefs are based. The list does not, however, I venture to think, include such things as that "this is a hand."

I therefore find it hard to see how Professor Moore can *know* the premiss of his proof, *viz.*, that "here is a hand"; and if he doesn't know this, then his "proof of an external world" collapses. However, as we have seen, he does claim to be able to show that he can know it; and since, despite what I have said, it is quite possible that he can show this, any *a priori* criticism may be merely a shot at random. I shall therefore turn to consider another point in his "proof of an external world."

It is important that we should be quite sure of what Professor Moore has claimed to prove. He has *not* attempted to prove the existence of things which are external to our minds in the sense that they could never come within the ambit of our knowledge. Such "external things" would perhaps be what Kant means by his *noumena,* objects "external in the transcendental sense." What Professor Moore does claim to have proved is that there do exist things which are such that there is no con-

tradiction in supposing them to exist at a time when no human being is having an experience. The desert rose, if it be an "external thing," might bud, and blush, and die unseen.

But how, in fact, does he prove that such things exist? He considers any type of object which satisfies the condition of being "meetable in space," e.g., a hand, and he asserts that it is part of what we mean by a *real* hand that there should be no contradiction in supposing it to exist unperceived. It is here that I find difficulty in his proof. If this be part of what we mean by a *real* hand, how can we ever know that we *are* being confronted by a *real* hand? Even if we were to grant that we can know such things as that "this is a hand," how can we know that there is no contradiction in supposing the hand to exist when no human being is having an experience? The world might be so constructed that things just pass out of existence when no one is perceiving them. The *Book of Kells* may disappear each day when the last visitor has inspected it. I do not see how we could ever *know* that it doesn't. Since, therefore, so far as I can see, we can't know this kind of thing, we can't know that "this is a *real* hand"; and this inability on our part is, I think, an objection fatal to Professor Moore's proof.

In conclusion, I shall briefly summarise the "proof of an external world" and state concisely the two objections to which I think it is liable. The "proof" runs thus: a thing "external to our minds" is a thing such that there is in no case a contradiction in supposing it to exist at a time when no human being is having an experience. It is part of the meaning of such a thing as a "real hand," i.e., a thing "to be met with in space," that it should be "external to our minds." But since I can know at this moment that "here are two hands," it follows that two hands do exist. Therefore, there do exist things "external to our minds" in the sense defined.

Against this argument I have urged the following objections. First, it seems to me not at all certain that we can know such things as that "here are two hands." And if this be the case, then Professor Moore's proof is not valid. Secondly, even if we could know that "here are two hands," it does not follow that we can know them to be *real* hands in Professor Moore's sense. That is to say, we do not know that there is no contradiction in supposing that these two hands could exist at a time when no human being was having an experience. We may firmly believe that there is no contradiction; but how could we know it? And if we don't know it, then we don't know that these hands are real in Professor Moore's sense; and we don't know that they are "external to our minds"; we may believe, but we haven't proved, that there is an external world.

E. J. FURLONG.

MIND-DEPENDENCE IN BERKELEY.[1]

BERKELEY'S teaching on mind-dependence deserves a special study, because some philosophers, convinced that the Berkeleian world is not mental, fall back on the assertion that it is mind-dependent. Dr. Dawes Hicks,[2] for instance, writes, "to demonstrate the mind-dependent character of secondary qualities was, therefore, for Berkeley imperative."

The term *depend* and its cognates occur some thirty times in the *Principles* and the *Three Dialogues*. I have analysed the passages,[3] and the result of my analysis, in summary form, is that the sensible world, for Berkeley, is *not* mind-dependent, as that term is commonly understood to-day, but is, at least in respect of the vast majority of sensible things, virtually independent of the human mind, remaining, however, absolutely and *in toto* dependent on the divine mind.

The distinction, here stressed, between the divine mind and the human, speaks for itself; the parallel distinction between ideas of sense and ideas of the imagination must be borne in mind, and, in addition, the distinction between causal and non-causal dependence is necessary for an exact interpretation of Berkeley's position. An illustration may

[1] References to the *Principles* give the section number; references to the *Three Dialogues* give the page number in Fraser's (1901) edition of the *Works*.

[2] *Berkeley*, pp. 124–5.

[3] Roughly classified, they are (1) Dependence of finite spirits, *Princ.* 30, 44, 147, 149, 155; *Hyl.*, p. 473, (2) Dependence of sensible things, *Princ.* 10, 26, 29, 33, 56, 89, 91, 102, 146; *Hyl.*, pp. 406, 407, 411, 417, 424, 427, 432, 446, 452, 473, 474, (3) Imagery and relative dependence, *Princ.* 12, 29, 33, 146; *Hyl.*, p. 452.

help to make this third distinction plain. While Cain and Abel are the only children of Adam and Eve, Cain "depends" upon Abel for his brotherhood. That is a non-causal dependence; there is nothing of agency in it. Cain does not depend upon Abel for generation or production. He existed before Abel, and may continue to exist when Abel is dead; but if Abel exists, Cain is a brother, and if not, not. A non-causal dependence belongs, in Berkeley's system, to those ideas of sense which are actually being perceived by the human mind. Their *esse* is *percipi*; they do not depend upon matter; there is no matter; they do not depend on the human mind for generation or production; they depend on the human mind for being minded, but for nothing more. They can exist when man is not minding them; therefore they are virtually independent of the human mind; but within the process of human perception they possess a low degree of dependence, containing nothing of agency in it.

If, therefore, we are to avoid cross-purposes in a discussion of mind-dependence, we must begin by asking, Of what mind are you speaking? Of which faculty of the human mind are you speaking? And, Which type of dependence have you in view? For, Berkeley teaches, the idea of sense is dependent on the divine mind, and the idea of the imagination is dependent on the human mind; but, except in a weak and watery sense of the term *depend*, the idea of sense does not depend on the human mind, and even that dependence on it which is to be conceded is confined to such ideas as are actually being at the moment sensed.

Before dealing with the passages which establish these contentions, I must speak of dependence in relation to substance. Berkeley took dependence seriously, because he took substance seriously. The two concepts are the same thing, looked at from above and below, respectively. By derivation substance means *standing under*, and

dependence means *hanging down from*; substance is support from below, dependence is support from above; dependence is to substance as is peg to prop. On what do things depend? What is their substance? The two questions are one, for Berkeley. This difference, however, is to be noted. He has a strict use and a less strict use of the term *dependence*; but he never, I think, uses the term *substance*[4] loosely. There are no degrees of substance; *this* is either substance, or it is not. The same holds of *dependence* in his strict use. *This* either depends, or it does not; there are no degrees of dependence; dependence is a necessary relation to active substance; and by calling things dependent he calls them passive entities, not self-caused, nor self-sufficient, nor self-explanatory, nor self-changing; in a word, he calls them *effects*, and that dependence which makes them effects is properly called *causal*. Ideas of sense depend absolutely on the operation of God; ideas of the imagination depend entirely on the operation of the human mind; and in both these cases Berkeley intends strict, causal dependence. But there are also passages in which he accepts partial and relative dependence, and varieties[5] of dependence; and in such passages he has weak, non-causal dependence in view—i.e., that dependence on the human mind possessed by the ideas of sense during the time in which they are being actually perceived by man.

We turn now to the text, and will begin with those passages in the *Principles* which declare the dependence of the sentient subject. Here there is no trace of ambiguity; there is nothing in dispute, but there has been very general neglect of this tenet, with consequent failure to appreciate

[4] He has, of course, the distinction between infinite substance and finite, between primary substance and derived; but the limitations of finite substance do not, for him, involve any weakening of the notion *substance*.

[5] Note especially "not a like dependence," sect. 29.

its significance for Berkeley's philosophy. Section 30 defines laws of nature as "the set rules or establish'd methods, wherein the mind we depend on excites in us the ideas of sense." Section 44 speaks of "the governing spirit, on whom we depend." Communication between finite minds "depends wholly on the will of the Creator" (sect. 147), and Deity is described (sect. 149) as "a spirit who is intimately present to our minds, producing in them all that variety of ideas or sensations, which continually affect us, on whom we have an absolute and intire dependence, in short *in whom we live and move and have our being.*" The book closes on this note with an earnest appeal for "conviction without all scruple . . . that He is present and conscious to our innermost thoughts; in fine, that we have a most absolute and immediate dependence on Him" (sect. 155). If readers do not take these quotations seriously, there is no more to be said; if this dependence is to them simply a piece of pulpit piety, they miss the pivot of the Berkeleian philosophy, and reduce his teaching about mind to an absurdity. It *is* absurd to hold that the human mind generates the myriad things of sense around us. It would be doubly absurd for Berkeley to do so with his clear vision of the immediate dependence of the human mind upon God. He regards man, with his sense organs and other powers, as a dependent being, who must take what is given. He regards God as a sovereign Being, who rules without a deputy, who makes all reality by direct operation, and maintains it immediately. There is no room in the Berkeleian scheme of things for the supposed production of the sensible world by the human mind.

We pass on from the subject to the object, from the sentient to the idea of sense. Ideas in general are described as ". . . dependent beings, which subsist not by themselves, but are supported by, or exist in minds or spiritual substances" (sect. 89). This is the central challenge of

immaterialism. The materialist accepted the dependence of ideas, but made them depend upon the wrong thing—viz., material substance. Those who made primary qualities exist without the mind, acknowledged that the secondaries "depend on and are occasion'd by the different size, texture, motion, etc., of the minute particles of matter" (sect. 10). Some physicists taught "that there is in each object an inward essence, which is the source whence its discernible qualities flow, and whereon they depend" (sect. 102); and the general prejudice in favour of matter is traced by Berkeley to men's awareness of ideas "as not being excited from within, nor depending on the operation of their wills" (sect. 56).

Matter failing us, upon what do sensible things depend? What is their substance? The reply, "Upon mind; mind is their substance," is not sufficiently explicit. Berkeley did not think of them as depending on mind, as do space and time and the categories in Kant. He saw them depending, along with finite minds, directly upon the mind of God; he saw "hanging in a golden chain this pendent world"[6]; he saw it "bound by gold chains about the feet of God."[7] He sets forth his vision in argument form (sects. 26 to 33) as the climax of his direct attack upon matter. From the continual succession of ideas, he infers "some cause of these ideas whereon they depend, and which produces and changes them." After distinguishing sense from the imagination, he goes on to argue that the ideas imprinted on the senses "are not creatures of my will. There is therefore some other will or spirit that produces them." The argument is repeated and made more exact later in the book, notably in section 146, where account is taken of the small changes you and I can make by pushing and pulling. He writes: "But tho' there be

[6] Milton, *Paradise Lost*, Bk. II.
[7] Tennyson, *Morte d'Arthur*.

some things which convince us, human agents are concern'd in producing them; yet it is evident to every one that those things which are call'd the works of nature, i.e. the far greater part of the ideas or sensations perceiv'd by us, are not produc'd by, or dependent on, the wills of men. There is therefore some other spirit that causes them, since it is repugnant that they should subsist by themselves." The same argument reappears in the *Three Dialogues* (pp. 424, 452), which also declares "the dependence of all things on God" (p. 473), styling this dependence "absolute and immediate" (p. 432), and "necessary and immediate" (p. 474).

I need not enlarge on these passages; they speak for themselves, and they show that the sensible world, for Berkeley, is a vast circle of dependent realities, created by God, actuated immediately by Him, and by Him exhibited to man. I have only to draw attention to the exclusive aspect of this dependence; there cannot be two centres of this circle. If the world depends for its cause, as Berkeley says it does, immediately on the mind of God, then it cannot so depend even mediately on the mind of man; and if in a sense a certain part of it does for a time *depend* on the mind of man, such *dependence* must be of a secondary character, not to be confused with the world's unshared dependence upon God.

Thus I make the transition to the more complex question of dependence on the mind of man. I began this article by saying that the sensible world, for Berkeley, is "in respect of the vast majority of sensible things, virtually independent of the human mind." That statement is correct, I hold; but it is too condensed to be clear at first sight; and I must now explain it, with special attention to the qualifying phrases, "the vast majority" and "virtually independent."

The former phrase represents Berkeley's "the far greater part of the ideas or sensations perceiv'd by us."

It refers to the works of nature,[8] which, says Berkeley, "are not produced by, or dependent on, the wills[9] of men" (sect. 146). The small minority of sensible things, the far smaller part of the ideas of sense, are, of course, those real things, which man can to some extent alter, and which, therefore, to that extent depend upon him—i.e., the things which would ordinarily be called artificial as opposed to natural, or works of man as opposed to works of nature. So far, then, all is quite clear; the sensible world, for Berkeley, consists of two unequal parts, or groups of ideas: (1) the works of nature, and (2) those things in whose production human agents are concerned. Ideas of the former group are *not*, says Berkeley, dependent on the human mind; those of the latter group, in so far as they *are* works of man (and that is not very far), are dependent on the human mind.

This simple division, however, has to come to terms with two other classes of ideas—ideas of the imagination, and ideas of sense actually being perceived by man. These classes create cross-divisions, complicate the issue, and tend to confuse the reader.

Ideas of the imagination and ideas of sense are alike in that they are passive and are immediately perceived; in other respects they differ, and neglect of this difference has given rise to much mistaken criticism of Berkeley.[10] We

[8] It is impossible and undesirable in writing of Berkeley's philosophy to observe any distinction between subjective terms, like *idea* or *sensation* and objective terms like *thing* or *works of nature*. He himself passes with supreme indifference from the one type of term to the other; and for an expositor to do likewise is a mark of having reached Berkeley's point of view.

[9] No distinction is intended by Berkeley, or could be maintained by him, between the mind of man and his will; for *mind* and *spirit* are the same (sect. 2), and "A spirit is one simple, undivided, active being, as it perceives ideas, it is called the *understanding*, and as it produces or otherwise operates about them, it is called the *will*" (sect. 27).

[10] e.g. Kant's criticism in his *Refutation of Idealism*.

can control our imagery, but not our sensations; we can make and unmake ideas of the imagination, but not ideas of sense. The contrast is elaborated in *Principles,* 28–30, 33, and in the *Three Dialogues,* p. 452. In all three passages the line between the two types of idea is sharply drawn. Ideas of sense are real; idea-images are unreal. God makes the former; man makes the latter. In sensing, our minds are passive, in imagining they are active. Sharp though the distinction is, yet in all three passages Berkeley uses the language of less and more with regard to dependence. Let me quote the passages: "But whatever power I may have over my own thoughts, I find the ideas actually perceiv'd by sense have not a like dependence on my will" (sect. 29). The ideas of sense "are also less dependent on the spirit, or thinking substance which perceives them, in that they are excited by the will of another and more powerful spirit" (sect. 33). He writes to the same effect in the third Dialogue: "The ideas formed by the imagination are faint and indistinct; they have, besides an entire dependence on the will. But the ideas, perceived by sense, that is, real things, are more vivid and clear; and being imprinted on the mind by a spirit distinct from us, have not a like dependence on our will" (p. 452).

Berkeley's idea of the imagination then depends, and depends entirely, on the human mind; there is no doubt on that point. With regard to his idea of sense, the position is more complex; one of the passages, just quoted, speaks of it as "less dependent"; and if it is *less* dependent, it must be at least to some extent dependent. Yet I venture to submit that in view of Berkeley's teaching elsewhere about its absolute and immediate dependence upon God, and its non-dependence[11] upon man, we are bound to explain the phrase *less dependent* here as

[11] See the passages quoted in the last paragraph below.

equivalent to *virtually independent.* Such an explanation can, I hold, be quite fairly given on the basis both of empirical fact and of the distinction between causal and non-causal dependence.[12]

There is an element of passivity in the freest flight of fancy; for the imagination is not creative, but works with given material. Just so there is an element of activity in passive sense-perception. "When in broad daylight I open my eyes," to take Berkeley's instance (sect. 29), no doubt my seeing is 90 per cent. passive; but *I* open my eyes, and unless I do so, I shall not see. A small percentage, therefore, must be credited to my activity. For that small percentage, for the low degree of activity involved in sense-perception, Berkeley's phrase "less dependent" allows. The context shows that "less dependent" is a figure of speech for "much less dependent"; and it would be a serious error to read it as the equivalent of *equally dependent* or *no less dependent.*[13] It is closely paralleled in the same sentence by the phrase, "more powerful spirit," used of Deity.

Berkeley, however, is clearly thinking of a difference in kind, as well as of a difference in degree; his "less dependent" must be interpreted by its companion phrase, "not a like dependence," which occurs in both books. He says, "the ideas actually perceiv'd by sense have not a like dependence on my will" (*Princ.* 29). When they are "actually perceived" by me, they must in a certain sense *depend* on me, and that dependence is what I have called *non-causal.* Dependence for production is one thing; dependence for reception is another. Berkeley explicitly denies the former, but, of course, he accepts the latter. He says that "the things perceived by sense . . . are not

[12] See above, pp. 117–19.

[13] Dr. Dawes Hicks actually uses the latter phrase, apparently by inadvertence, in his exposition of this passage. *Berkeley,* p. 109.

generated from within, by the mind itself" (sect. 90). He laughs at the view that we make them unconsciously.[14] That sort of dependence on the human mind, which has been called psychologism, and has been attributed to Berkeley, is really foreign to his system. His ideas of the imagination depend entirely on the human mind[15]; his ideas of sense do not depend upon it at all *for production*, but they do depend on it for reception. I do not make what I see; I have virtually no control over it; but unless I open my eyes and attend, I shall not see it. When I see it, it is in my mind, and to that extent, and that extent only, it depends upon my mind. Therefore, Berkeley grants to ideas, actually being sensed, the non-causal dependence which is involved in the mere fact of presentation to the mind; but he quite consistently maintains that for origin and production ideas of sense depend on God, and on God alone.

I will conclude by quoting four passages from the *Three Dialogues* which explicitly declare that sensible things do not depend, in the strict sense of that term, upon the human mind. "Neither can it be denied that this tulip may exist independent of your mind or mine" (p. 406). On the following page the smell of the flower is analysed. The sniffing is ascribed to my volition. "Whatever more there is—as that I perceive such a particular smell, or any smell at all—this is independent of my will, and therein I am altogether passive." On page 424 Berkeley sets it forth with emphasis, with clearness, and with solemnity, as the very ground of his argument for the existence of God, that sensible things "depend not on my thought, and

[14] "When we talk of unthinking agents, or of exciting ideas exclusive of volition, we only amuse ourselves with words" (sect. 28).

[15] e.g. number, which is "intirely the creature of the mind . . . visibly relative, and dependent on men's understanding" (sect. 12).

have an existence distinct from being perceived by me." [16] Finally he says (p. 446): "It is plain they (sensible things) have an existence exterior to my mind; since I find them by experience to be independent of it."

A. A. LUCE.

[16] See also p. 427, where an equivalent statement is made, qualified, however, by a mention of *archetypes*, on which see my article on *Berkeley and Johnson*, in *Hermathena*, No. LVI, 1940, especially pp. 103–4.

THE SIZE OF THE LIZARD.

esse aliquid, quocumque loco, quocumque recessu
unius sese dominum fecisse lacertae.

JUVENAL, III, *vv.* 230–1.

DR. JOHNSON'S comment on these lines is well known: but, whatever way they are explained, whether the reference is primarily to the ubiquity of the lizard (so Johnson, with the Scholiast, Lewis, Duff) or to the smallness of the garden in which just one lizard could be kept (Mayor, Pearson and Strong, Hardy, Macleane, L. & S.), it seems clear that the lizard is itself chosen as typifying a small creature.[1] The editors variously cite, according to the fancy of each, this line or that from Martial, XI, 18 to illustrate minuteness within minuteness: but the analogies they find there are more apparent than apt, as of the twenty small objects which the gift farm is itself too tiny to accommodate (or by which it is measured), the lizard is not one. There is, however, a passage in which the smallness of the lizard is insisted upon—a passage which I believe, for the reasons given below, Juvenal actually had in mind (though it has indeed escaped Mayor's widely cast net). In Ovid's *Metamorphoses,* Book V, Ceres, to punish a slight affront, changes the boy Stelio into a lizard (*vv.* 457–8):

inque brevem formam, ne sit vis magna nocendi,
contrahitur, parvaque minor mensura lacerta est.

[1] The oriental monsters (? crocodiles or six-foot monitors) reported by Aristotle, *H.A.*, 606b, 28 (*ἐν Ἀραβίᾳ σαῦραι μείζους πηχυιαίων*), and by Pliny, *N.H.*, VIII, 39, 60 (*lacerti Arabiae cubitales: in Indiae vero Nysa monte xxiv in longitudinem pedum*), are, like the recently discovered twelve-foot Komodo Dragon of our own day, obviously *hors concours.* I do not know whether Forcellini's remark that *lacerta* is a smaller variety of *lacertus* is true: such a distinction does not appear to hold for *σαύρα*)(*σαῦρος.*

The note of "littleness" rings throughout—*brevem, ne . . . magna, contrahitur, parva, minor,* leading to the κολοφών, *lacerta.*

It is to be observed that Juvenal's reference to the lizard comes as the epigrammatical climax by which he characteristically caps his *laudes ruris.* His last words have told of the home produce of a small farm—"sufficient to feed a hundred vegetarians." Thoughts of Ceres are not far off; the Ceres of his own native Arpinum is indeed mentioned later in the same Satire (*v.* 320); and Juvenal is generally believed to have been intimately connected with the worship of this local Ceres (*C.I.L.*, X, 5382, quoted by all the editors): so that it seems not at all unlikely that an association of ideas here recalled to one who had Ceres very much in mind a detail of what must have been to him the very familiar[2] Ceres-episode in the *Metamorphoses.*

L. J. D. RICHARDSON.

[2] Juvenal's familiarity with the *Metamorphoses* reached even word-perfect reminiscence, as is clear from *consedere duces . . . Aiax* (*Met.*, XIII, 1–2; Juv., VII, 115). I have collected many other echoes of Ovid in the *Satires* of Juvenal.

KOTTABISTAE.

BALADE POUR PRIER NOTRE DAME.

Dame du ciel, regente terrienne,
Emperiere des infernaux palus,
Recevez moy, vostre humble chrestienne,
Que comprinse soye entre vos eslus,
Ce non obstant qu'oncques rien ne valus.
Les biens de vous, ma Dame et ma Maistresse,
Sont trop plus grans que ne suis pecheresse,
Dans lesquelz biens ame ne peut merir
N'avoir les cieulx, je n'en suis jangleresse :
En ceste foy je vueil vivre et mourir.

A vostre Filz dictes que je suis sienne ;
De luy soyent mes pechiez abolus :
Pardonne moy comme a l'Egipcienne,
Ou comme il feist au clerc Theophilus ;
Lequel par vous fut quitte et absolus,
Combien qu'il eust au deable fait promesse.
Preservez moy de faire jamais ce,
Vierge portant, sans rompure encourir,
Le sacrement qu'on celebre a la messe.
En ceste foy je vueil vivre et mourir.

Femme je suis povrette et ancienne,
Qui riens ne sçay ; onques lettre ne lus.
Au moustier foy, dont suis paroissienne,
Paradis paint ou sont harpes et lus,
Et ung enfer ou dampnez, sont boullus :
L'ung me fait paour, l'autre joye et liesse.
La joye avoir me fay, haulte Deesse,
A qui pecheurs doivent tous recourir,
Comblez de foy, sans fainte ne paresse.
En ceste foy je vueil vivre et mourir.

BALLAD WHICH VILLON MADE AT THE WISH OF HIS MOTHER FOR A PRAYER TO OUR LADY.

Queen of the Sky and Earth, Lady Divine
Of hidden worlds, and lands funereal:
Receive, I pray, this humble soul of mine
Amongst the blessed, in thy shining hall:
This notwithstanding that my worth is small,
Greater thy love than my sins reckoning
Only such love, O Queen, may ever bring
Sinners to Heaven (faith this is no lie!)
O Star of Grace, O tender Branch of Spring,
In this my faith, please God, I live and die.

Tell thy Bright Child that I am His and thine,
May He forgive me whatsoe'er befall.
Mary of Egypt did He shrive and sign,
And, through thee, He did pardon and recall
The clerk, Theophilus, the Devil's thrall.
Against such perils give me safeguarding,
O Lily quickened by the Angel's wing,
Virgin who bore the Sacred Mystery
For which the holy bells of High Mass ring.
In this my faith, please God, I live and die.

I have not scholarship to read a line,
I am a poor old woman in a shawl;
I see in my own chapel near the shrine
Heaven and Hell both painted on the wall;
Aye, harps and lutes and burning flames and all;
Great joy one puts on me and thanksgiving,
The other dread of the fire's tormenting.
Bring me to Heaven, Lady of the Sky;
In thee I trust, to thy two hands I cling.
In this my faith, please God, I live and die.

Vous portastes, Vierge, digne princesse,
Jesus regnant qui n'a ne fin ne cesse.
Le Tout Puissant, prenant nostre foiblesse,
Laissa les cieulx et nous vint secourir,
Offrit a mort sa tres chiere jeunesse;
Nostre Seigneur tel est, tel le confesse.
En ceste foy je vueil vivre et mourir.

FRANÇOIS VILLON.

WE THAT ARE OLD.

We that are old have little will
To linger on;
Life may be well enough, but still
The zest has gone.

Yet if death came for us one day
We should feel cheated;
The hope, for which we crave to stay,
Would be defeated.

We live each day, we live each night,
With a dumb pride,
Confident we shall see the right
Yet justified—

Shall see that monstrous braggart strength
Crushed and down-borne—
Confident that the world at length
Will share our scorn.

Yet, to drop out and miss the thrill
Of exultation
That spreads and surges—as it will—
Through all the nation—

Virgin Princess, you bore the noble King,
Jesus, the earth's eternal blossoming.
Lord of all things, God shared our suffering;
Let His Son go to help us from the sky,
Offered to Death His most dear Fosterling.
Now such is God: none else had done this thing.
In this my faith, please God, I live and die.

K. GOODFELLOW.

SENEX LOQUITUR.

Nobis quorum aetas senior deest certa voluntas
ducere difficilis temporis usque moram;
vita manet; nec nos querimur discrimina vitae;
sed cecidit vitae vis, ceciditque vigor.
Pallida sed diro si mors terrore propinquet
haud mora, "Decepti," nostra querella, "sumus":
si veniat letum, nostra irrevocabilis hora,
spes tunc vana foret quae remanere iubet.
Gloria corda, dies noctes dum vivimus, implet
quae tamen haud possit rumpere voce sonum.
Certa fides: veniet nobis spectantibus ultor
iustitiae, sontes dedecus omne luent;
improba quae se nunc clamoso gutture iactant
robora cernemus fracta iacere solo;
nam tumidos hodie soli nos spernimus: olim
(ne dubites) spretor totus et orbis erit!
Perdere sin opus est palmam laudemque supremam,
gaudia quae serus laeta triumphus aget
(gaudia nam venient; bacchabitur impetus ingens
per populum nostrum, per fora, perque focos),
sin pereamus adhuc dubiam spem corde tenentes,
sin ubi nondum aderat non dubitata salus—
exilio nimium nos sic capiamur acerbo

To die, obscurely confident,
Not clear-assured,
That were indeed a banishment
Hardly endured.

But should death swoop down from the sky
With rush and roar,
An old man may be proud to die
Who dies in war.

He stood where heretofore they stood
Who were the strong,
He fell as men fell who made good
Their names in song.

Though not in limb or sinew staunch
He kept reliance.
The soul unshaken still could launch
Supreme defiance.

So, through swift dark or lingering light,
Let our goal be
Death's honour—or, at last, delight
In victory.

STEPHEN GWYNN.

quod iubeat miseros vix patienda pati.
Sed licet ingenti letum de gurgite caeli
mortifero fundens tela tremore tonet,
forte cadam belli medio clamore; cadenti
nonne seni talis gloria dulcis erit?
Quo prisci steterant audax hic stabat; at illos
praebuerant fortes fortia facta viros;
non aliter cecidit quam cum cecidere priores
nomina quorum etiam carminis arte vigent;
membra licet male fida seni nervique trementes,
huius erat numquam sollicitata fides;
hostis et oppositas extrema ad proelia vires
impavidum potuit cor provocare suum.
Nox veniat subito maneantve crepuscula longa,
una tamen nobis ultima meta patet;
vel mors perpetuum rapiens nos cedet honorem,
gaudia vel victrix denique palma dabit!

A. T. Hanson.
R. P. C. Hanson.

REVIEWS.

The Economics of Ancient Greece. By H. MICHELL. Cambridge University Press. 1940. Pp. 415. 18s.

LIKE every author of a general description of economic life in classical society (e.g., Toutain, *L'Économie Antique;* Glotz, *Ancient Greece at Work*), Professor Michell has had to face a number of serious difficulties. First, the practically complete absence of reliable quantitative data inevitably reduces every description to a list instead of a pattern, and a list devoid of any concrete indication of relative importance, and forbids any close analysis of changes in time. Even the perception of changes in time is obstructed by the haphazard time-distribution of the available scraps of information. Consequently, the essential chapters on Agriculture, Mining, Industry, Commerce, Money, Banking, Labour and Public Finance assume the appearance of so many catalogues of activities pursued, processes employed, objects traded and legal enactments, not woven into a coherent pattern such as is presented by, e.g., the League of Nations Report on Austria. Professor Michell's handling of this part of his work possesses many merits—he has successfully resisted the temptation to drift into prosy anecdotage; his picture is full, accurate and freshly drawn; by constant admonition he keeps his reader's attention drawn to the problems of proportion and significance as well as to those of interpretation; in a number of passages (e.g., p. 83—farming; p. 132—cost of living; p. 162—slavery) he has attempted with considerable success to evaluate the results of Greek economic activity in a concrete, if not quantitative, sense.

Secondly, when available quantitative *data* are very scrappy, the temptation is ever present to overlook the passage of time and to treat as comparable figures separated by wide intervals of time; this is especially liable to happen in relation to prices and wages. An analogous error, in an economy so broken up by natural and human obstacles to movement as that of Greece, is the ignoring of local differences in prices, etc. Professor Michell

has generally been wary on this score, but has slipped occasionally. While on this subject, the reviewer's chief disappointment has been the absence of any examination of the epigraphic material on temporal price changes and local price differences. The little that Professor Michell has to say is not entirely consistent: his remarks on the value of money (p. 333) do not agree with those on wages (p. 131) and the cost of living (p. 133).

Thirdly, when so much of our available *data* concern Athens, Sparta and one or two others of the larger cities, the temptation to accept these as characteristic of Greek economy in general is insidious. Professor Michell is on his guard against this also, and seeks to keep the reader alert as well by constant admonition. Nevertheless (and the author cannot be blamed for it), the relative bulk of the references must leave on the reader an impression unduly coloured by Athenian life. In one sense, that is reasonable enough, as the Athenian was the most complex and most highly developed of the Greek economies, and represented the best they were capable of. But it was very far from typical, and probably three-quarters of the Greek population lived under very much simpler conditions. There is not really much reason to believe that the views and habits of the Athenian gentleman and demagogue and the Spartan oligarch were shared by the *petit bourgeois* of such a smallish city as Sicyon, which would be much more representative of the Greek people as a whole. Possibly an attempt to reconstruct, even with some aid from the imagination, the economic anatomy of some such smaller city would do much to correct natural but erroneous general impressions.

Fourthly, many writers have found it impossible to resist the tendency to exaggerate the scale of Greek economic operations and to over-state the rational and deliberate element in Greek economic "policy." Professor Michell takes pains to avoid this pitfall, and seems to slip up only once (p. 305).

Before mentioning the positive merits of Professor Michell's treatment, a few minor points may be noticed. His discussions of the economic value of slavery, interest rates and the transformation of Attic farming in the fifth century are suggestive but not entirely satisfying. Some of the uncertainty about interest rates (p. 348) is explainable by the rates being chargeable *per* voyage and not *per mensem* or *per annum*. The precariousness of Athenian finances was due not to the city's "unfavourable balance of trade" (p. 354), but to her dependence on the allies' tribute, especially after it had been diverted to non-reversible uses. The Periclean public works did not "put money into cir-

culation when the failure of money to circulate or 'turn-over' owing to lack of opportunity for investment was one of the most serious problems underlying the whole economic structure of society" (p. 367): that view is tenable only on the supposition that the allies from whom it was extorted would have "thesaurised" it, although undoubtedly it gave Athens itself a parasitical hyper-activity. A tax on slaves (p. 375) is really a direct tax on their owners, like a motor-car tax. Possibly an acquaintance with Johnston's paper on the Cyzicene stater [HERMATHENA, vol. XXII, 1932: *"An International Managed Currency in the Fifth Century"*] would have modified some of his views on Greek currency practice.

Professor Michell's book is to be specially commended for its lucid exposition of and constant insistence on the radical problems of the Greek economy. One of these was the enduring poverty of Greece as a food producer, deriving from geological and climatic difficulties that Greek technique was unable to overcome, and never safely (owing to the inefficiency and danger of their long-sea transport) compensated by imports from more productive cereal-growing regions. Hence came that endemic land-hunger, relieved by intermittent agrarian revolutions and colonisation, which Professor Michell rightly emphasizes, though perhaps he attributes too much weight to vicious systems of land ownership and tenure; in Greece, as in Ireland a century ago, the viciousness of the system was enormously enhanced if not created by the pressure of population on the land. Grave, however, as was the poverty of the Greeks, we have no means whatever of comparing it with contemporary standards, in the absence of satisfactory quantitative *data* relating to incomes, in either real or monetary terms, and consumption.

Another was the apparent constant wastage of Greek effort and intelligence on activities that contributed nothing or less than nothing to their material and spiritual well-being, and the surprising failure of their intellectual achievements to realise practical inventions. Professor Michell wisely refuses to attach too much importance to the view that one important cause of this is to be found in a fixed prejudice against physical labour as vulgar, and is more inclined to attribute it, in the case of Athens at any rate, to the demoralising effect of the πολιτικοὶ μισθοί. Another possible reason, applying to Greece as a whole, is that in the Aegean climate life can be supported in a passable manner on a much smaller supply of necessaries than in more rigorous climates,

and the Greeks were on the whole content with a physical standard of living which we should regard as insufferably meagre.

A third and equally important problem was the unsoundness and demoralising effects of Greek public finance. Again, our knowledge of public financial institutions outside Athens is scanty, but Professor Michell is almost certainly right in suggesting three consequences, general throughout Greece, deriving from the weakness of their financial methods: the inability to sustain systematically planned public activity; the demoralisation of dole-fed citizens; and the cleavage of interest between the taxbled and the tax-fed, a cleavage contributing largely to the endemic στάσις which so often paved the way to tyranny, and finally left Greek democracy impotent in self-defence. Professor Michell's analogy of the growth of Fascist tyranny in our own times could be further developed: the public finances of the British Isles and the U.S.A. were, before the war, moving significantly in the same direction as Athenian finances in the latter part of the fifth century and the fourth century B.C., and the fear that the same political situation—a majority of the population looking upon the Exchequer as a milch-cow, and possessing and using its political power to feed it by "soaking" the richer minority—might in time produce the same shorter-run consequence—στάσις—and longer-run consequence—tyranny—was not entirely fanciful. Naturally, other cities could not practise dole-finance on the same scale as Athens, the imperial parasite.

G. A. DUNCAN.

Andrew Marvell. By M. C. BRADBROOK and M. G. LLOYD THOMAS. Cambridge University Press. 7s. 6d. (viii + 156 pp.)

THE twentieth century sets the best of Marvell's lyrical poems on the level of the best of Donne's, or above it, but Marvell's admirers know very little of the qualities as a fighter against intolerance in Church and State which kept his fame alive for more than a century after his death. In this study Marvell's achievement is taken as a whole, and he is set in perspective

against the thought and circumstances of his day. Marvell's best in poetry is not extensive, and a good anthology can cover most of it. The discipline of the straightforward march in the Horatian Ode, the thoroughness of the shattering assault on the Petrarchan convention in the "Coy Mistress," the lament of the Nymph for her Fawn—a little rococo perhaps, but so charming for what the Nymph says that it seems almost a pity to pursue its implications as the authors here are bound to do—the sweet and logical ingenuity of "Upon Appleton House," the garden poems, and the Emigrants in Bermuda—these, with a few more of what are somewhat vaguely called the Nunappleton poems, make up the discriminating reader's acquaintance with Marvell.

The effect of this study is not so much to suggest that the discriminating reader's choice is too narrow, or even that too much attention is paid to the lyrics and too little to Marvell's other works, as to enrich very considerably the experience of reading this small body of poetry upon which his reputation so securely rests. His strong and endearing qualities are obvious enough. Marvell's political moderation is part of an attitude of mind which expresses itself in his verse by the taste which preserves him from the worst affectations of poetic wit in his day, and one aspect of which is his urbanity—the urbanity of breeding. There is something characteristic of Marvell in the lines in which, supporting Milton's firm defence of the use of blank verse in "Paradise Lost," he puts himself amongst the writers in rhyme:

> "I too, transported by the mode, offend,
> And while I meant to praise thee, must commend."

But so there is in the faint but perceptible distaste of some passages in the Horatian Ode in praise of Cromwell, who:

> "Could by industrious valour climb
> To ruin the great work of Time,
> And cast the kingdoms old,
> Into another mould,"

and the famous lines on the execution of Charles in the same poem have the sense of the tragic futility and waste of violence which comes out in the exquisite lament for the Civil War in "Appleton House." So, too, the imaginative intensity of his approach to nature, with its looking forward to the identification of the poet with the nature-processes that comes with the romantic movement, displays this attitude of mind in his consciousness of

the vulgarity of suffering inflicted upon helpless creatures. The mower who kills the corncrake:

> "The edge all bloody from its Breast
> He draws, and does his stroke detest."

sounds a note scarcely heard between the stricken deer in "As You Like It" and the evicted fieldmouse of Burns.

The poems in which Marvell's mind is revealed stand to gain more than the works of less logical and consistent thinkers in verse by the kind of examination to which they are here subjected. Sometimes, perhaps, it may be carried too far. The argument of "The Garden" is so perfect and complete in itself that it is weakened rather than strengthened by the contention in this book that the lines about the gods and the trees are intended to indicate that Apollo hunted Daphne for the laurel crown of poetry, and that Pan sped after Syrinx to capture music, and it is difficult to agree that the Latin version brings this out more unambiguously. But a great deal of light is thrown upon the poems generally, both by the analysis of Marvell's designs and by reference to the state of language and thought in his day. There are many passages of the highest value—for example, on the geometric metaphors in "The Definition of Love," or on Marvell's use of imagery from science and chemistry. A charming discovery is the parallel between Marvell and Mildmay Fane, Earl of Westmoreland and Fairfax's brother-in-law. The book includes two portraits of Marvell and an illustration of such a flower-dial as "the skilful gardener drew."

R. B. D. FRENCH.

Philip V of Macedon. By F. W. WALBANK. 1940. Pp. xi + 387. 2 plates. Cambridge, at the University Press. 18s.

THIS is an extremely able study covering the crucial period of European history which saw the first impact of the invincible Roman military machine on the older and richer civilisation of the eastern Mediterranean, and the reaction of that civilisation on Rome. The author shows complete mastery of the ancient sources, and he has read extensively in the modern literature of his subject (his bibliography runs to fifteen pages). We are given a well-documented and authoritative treatment of Philip's youth, and of the attempted expansion South, West (in abortive co-operation with

Hannibal), and East (ending in war against Rome); there followed a period of collaboration with Rome against Antiochus, and a final advance northwards into the Balkans, which left Macedon stronger than at any time since Philip's accession, but also foredoomed to extinction at the hands of Rome. Philip died before his time, disillusioned, embittered, and worn out by his continuous campaigning. Throughout his lifetime Rome never showed him any generosity, just as she showed no generosity to vanquished Carthage: surely the memories of the Second Punic War had bitten deeper than the author suggests (p. 72). Philip himself remains an enigmatic figure, and the book is rather an historical monograph dealing with Macedonian history during Philip's lifetime than the biography of a living individual. Polybius himself was baffled by Philip's character and his motives of action, and a modern historian, however sympathetic, can hardly expect to succeed where a contemporary failed. As was to be expected, Philip's army was outmanœuvred and outfought by the legions (economic conditions probably explain the decline of the Macedonian cavalry, which had given Alexander the Great his resounding victories). But it is extraordinary to find Philip defeated in the diplomatic battle of wits by Flamininus. He seems to have been far more of a barbarian and less of a Greek even than Philip II, and to have had his full share of the Macedonian contempt for the Greeks (mingled with admiration, and heartily reciprocated); hence his outbursts of passion and callousness, and hence his sardonic humour, in which he was closer to the Roman than to the Greek mentality.

The book acquires a topical interest from the successive campaigns in Albania and Thessaly: it is to be noticed that the fate of western Greece hinged on control of the Tepeleni area, and that the initiative on land was seized and held by the power which was dominant on sea. The military history could hardly have been better treated, and its understanding is materially assisted by the plate facing p. 148 and by the numerous maps. There are useful appendixes dealing with the sources, the Macedonian army under Philip, and details of chronology. In spite of the modest claims advanced by the author in his preface, it can be confidently prophesied that this book will prove to be more than an ἀγώνισμα ἐς τὸ παραχρῆμα and will remain the standard work on this subject for very many years to come.

D. E. W. WORMELL.

A Chronology of the Plays of Plautus. By C. H. Buck, Jr. 1940. Pp. 112. Baltimore.

This is an unpretentious Ph.D. dissertation, which makes a new survey of the evidence for the dating of Plautus' plays, starting from the established fact that the *Stichus* and the *Pseudolus* were first performed in 200 and 191 B.C., and basing most of its conclusions on passing references by the characters to contemporary events. The author maintains that the plays fall into two chief groups—the first ending in 200, the second beginning in 194. He has no explanation of this six years' gap—his belief that several genuine works of Plautus were excluded from the Varronian canon and have perished seems very questionable. His study should help to demolish the arbitrary assumption that Plautus wrote at the rate of a play a year; and, although the testimony which he adduces to support his chronological scheme is of unequal value, he has some interesting suggestions to offer, notably that *instauratio* of the games indicated a popular play, and should be considered as a criterion for dating plays known to have been successful.

D. E. W. Wormell.

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